PARAIS INTERNATIONAL EXHIBITION

1900

DESCRIPTIVE CATALOGUE

OF A COLLECTION OF THE

Economic Minerals of Canada



Printed by Direction of the
Canadian Commission for the Exhibition

This Annotated Catalogue of the Economic Minerals of Canada has been compiled by members of the staff of the Geological Survey of Canada, to accompany the collection displayed in the Canadian Pavilion at the Paris International Exhibition of 1900. The collection itself has been brought together and arranged under the auspices of the Geological Survey of Canada, in cooperation with the several Provincial Mining Bureaus and with the assistance also of a number of firms and private individuals.

The specimens are primarily arranged in natural groups according to composition and the purposes for which the several ores and other minerals are employed. The secondary arrangement is a geographical one, the enumeration, under each group, being as nearly as possible from west to east, by provinces and districts, as follows :—Yukon Territory (Y.T.), British Columbia (B.C.) North-West Territories, except Yukon (N.W.T.), Manitoba (Man.), Ontario (Ont.), Quebec (Que.), North-East Territory (N.E.T.), New Brunswick (N.B.), Prince Edward Island (P.E.I.) Nova Scotia (N.S.)

The name and address of the exhibitor of each specimen, or that of the owner or operator of the property or mine from which it is derived, is generally given, even when the exhibit has been collected by the Geological Survey or Provincial Mining Bureau.

In compiling the Catalogue, reference has been made to that previously prepared for the Colonial and Indian Exhibition of 1886, to various reports of the Geological Survey and to the provincial reports. Information has also been obtained directly from many of the exhibitors and from other sources. The length of the explanatory notices must not, however, in all cases, be accepted as indicative of the relative importance of the deposits to which they refer, as the Catalogue has had to be prepared in a limited time and the facts at hand, in some instances, have not been so complete as might have been desired.

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TABLE OF CONTENTS.

I. Metals and Their Ores. PAGE.

Alluvial Gold	1
Gold, milling ores	16
Gold, smelting ores	45
Gold, silver-copper ores	54
Silver ores	61
Silver-lead ores	63
Silver-copper ores	81
Native copper	87
Ores of copper	87
Lead	103
Zinc	106
Platinum	107
Mercury	108
Antimony	109
Nickel	110
Cobalt	113
Iron	114
Magnetite	117
Hæmatite	124
Limonite and bog-iron ore	130
Other iron ores	131
Manganese	133
Chromite or chromic iron ore	136
Tungsten	137
Molybdenite	138

II. Materials Used in the Production of Light and Heat.

Anthracite coal	139
Bituminous coal and lignite	140
Anthraxolite	150
Albertite	150
Bituminous shales	151

PAGE.

Peat 152
Petroleum 153

III. Minerals Applicable to Certain Chemical Manufactures and Mineral Fertilizers.

Pyrites 159
Magnesite 160
Celestite or sulphate of strontium 160
Strontianite or carbonate of strontia 160
Lithia 161
Apatite 161

IV. Mineral Pigments.

Iron ochres 162
Baryta 163

V. Salt and Brines 164

VI. Refractory Materials and Materials Applicable to the Manufacture of Pottery, Chinaware, etc.

Asbestus 167
Mica 168
Graphite (plumbago) 171
Fire Clay 173
Felsite 174
Felspar 174
Soapstone (steatite, compact talc) 175
Potstone (compact chlorite) 175
Talc 176

VII. Materials for Grinding and Polishing.

Corundum 177
Grindstone and pulp-stone 179
Infusorial earth 180
Garnet rock 181

VIII. Minerals Applicable to Fine Arts and Jewellery.

Cut and polished stones 182
Amethyst 183

PAGE.

Lithographic stone 183
Sodalite 184
Mountain cork 184
Amber (chemawinite) 184

IX. Materials Applicable to Common and Decorative Construction.

Granite, gneiss, etc 185
Serpentine 189
Quartz-andesite 191
Breccia and conglomerate 192
Sandstone 192
Roofing slate 198
Limestone and marble 198
Lime and cement 209
Shell marl 213
Gypsum 213
Brick and terra-cotta 216

INDEX TO SPECIMENS EXHIBITED.

Number.			Page.
1	Marble	Dudswell, Que	207
2	Serpentine	Melbourne, Que	190
3	Granite	Stanstead, Que	187
4	Syenite	Grenville, Que	187
5	Syenite	Grenville, Que	187
6	Limestone	Montreal, Que	203
7	Serpentine limestone	Grenville, Que	206
8	Epidotic gneiss	Ramsay, Ont	187
9	Coal	Anthracite, N.W.T.	139
10	Coal	Canmore, N.W.T.	143
11	Steatite	Bolton, Que	175
12	White Marble	Portage du Fort, Que	207
13	Corundum	Raglan, Ont	177
14	Potstone	Bolton, Que	175
15	Barite	Hull, Que	163
16	Graphite	Buckingham, Que	172
17	Graphite	Brougham, Ont	172
18	Bog iron ore	Vaudreuil, Que	130
19	Magnetite	Kinnear's Mills, Que	122
20	Bornite	Acton, Que	101
21	Molybdenite	Ross, Ont	138
22	Molybdenite	Egan, Que	138
23	Bornite	Harvey Hill, Leeds, Que	101
24	Chalcopyrite	Harvey Hill, Leeds, Que	101
25	Molybdenite	Alleyn, Que	138
26	Talc	Grimsthorpe, Ont	176
27	Mountain cork	Hull, Que	184
28	Sandstone	Calgary, N.W.T.	193
29	Apatite	Portland, Que	161
30	Chalcopyrite	Ascot, Que	159
31	Chalcopyrite	Bolton, Que	101
32	Apatite	Wakefield, Que	161
33	Magnetite, cobaltiferous	Madoc, Ont	121
34	Niccolite	Calumet Island, Que	112
35	Dolomite	Tyndall, Man	199
36	Dolomite	Selkirk, Man	198
37	Sandstone	Boissevain, Man	193
38	Dolomite	St. Andrews Rapids, Man	199
39	Dolomite..	Lake Manitoba, Man	199
40	Marble	Vancouver Island, B.C.	203
41	Marble	Renfrew, Ont	205

No.			Page.
42	Serpentine, marble	Hull, Que	206
43	Felspar	Cascades, Hull, Que	174
44	Steatite	Bolton, Que	175
45	Slate	Melbourne, Que	198
46	Limestone	Beamsville, Ont	200
47	Limestone	Thorold, Ont	200
48	Limestone	Niagara, Ont	200
49	Sandstone	Caledon, Ont	194
50	Sandstone	Caledon, Ont	194
51	Dolomite	Guelph, Ont	199
52	Dolomite	Guelph, Ont	199
53	Limestone	St. Mary's, Ont	202
54	Sandstone	Orangeville, Ont	194
55	Sandstone	Owen Sound, Ont	194
56	Limestone	Hawkesbury, Ont	201
57	Syenite	Mt. Johnson, Que	187
58	Sandstone	Pembroke, Ont	194
59	Limestone	Pembroke, Ont	201
60	Sandstone	Beauharnois, Que	195
61	Dolomite	Beckwith, Ont	201
62	Limestone	Goderich, Ont	199
63	Limestone	Hull, Que	202
64	Limestone	Montreal, Que	203
65	Limestone	Caughnawaga, Que	202
66	Limestone	Gloucester, Ont	201
67	Limestone	Nipigon Bay, Lake Superior, Ont	204
68	Limestone	La Chevrotière, Que	203
69	Granite	Portland, Que	188
70	Sodalite	Dungannon, Ont	184
71	Limestone	Kensington, Que	207
72	Limestone	Dudswell, Que	208
73	Limestone	Arnprior, Ont	205
74	Limestone	Caughnawaga, Que	207
75	Limestone	St. Dominique, Que	208
76	Limestone	Pakenham, Ont	205
77	Limestone	Pointe Claire, Que	207
78	Limestone	Cornwall, Ont	206
79	Limestone	St. Armand, Que	208
80	Limestone	Texada Island, B.C	204
81	Marble	St. Joseph, Beauce, Que	208
82	Serpentine	Grenville, Que	206
83	Serpentine	Grenville, Que	206
84	Serpentine	Grenville, Que	206
85	Serpentine	Stukely, Que	191
86	Phlogopite	Gracefield, Que	170
87	Serpentine	Calumet Island, Que	190
88	Dolomite	Dundas, Ont	210
89	Serpentine	South Ham, Que	190
90	Serpentine	Melbourne, Que	190
91	Serpentine	Melbourne, Que	190

No.			Page.
92	Serpentine	Melbourne, Que	191
93	Serpentine	Melbourne, Que	191
94	Serpentine	Orford, Que	191
95	Serpentine	Orford, Que	191
96	Serpentine	Orford, Que	191
97	Serpentine	Orford, Que	191
98	Serpentine	Orford, Que	191
99	Serpentine	Shipton, Que	191
100	Breccia	Ballinac Islands, B.C.	192
101	Limonite	Londondery, N.S	130
102	Sandstone	Newcastle Island, B.C	192
103	Anorthosite, granite	Chicoutimi, Que	188
104	Siderite	Londonderry ,N.S	133
105	Scheelite	Marlow, Que	137
106	Jasper conglomerate	Bruce Mines, Ont	192
107	Ilmenite	Bay St. Paul, Que	132
108	Pyrolusite	Jordan Mt., N.B.	134
109	Auriferous quartz	Michipicoten, Ont	36
110	Granite	Kingston, Ont	186
111	Gneiss	Kingston, Ont	186
112	Limestone	Puslinch, Ont	200
113	Sandstone	Calgary, N.W.T	193
114	Sandstone	Grimsby, Ont	193
115	Sandstone	Alberta, N.W.T	193
116	Limestone	Renfrew, Ont	201
117	Marble	St. Joseph, Beauce, Que	208
118	Granite	St. George, N.B	189
119	Magnetite	Lavant, Ont	121
120	Hæmatite	Marmora, Ont	126
121	Hæmatite	Darling, Ont	127
122	Magnetite	Atikokan River, Thunder Bay, Ont.	118
123	Hæmatite	Portland, Ont	126
124	Hæmatite	Portland, Ont	126
125	Magnetite	Madoc, Ont	121
126	Hæmatite	Portland, Ont	126
127	Magnetite	Snowdon, Ont	120
128	Magnetite	Wollaston, Ont	120
129	Magnetite	Wollaston, Ont	121
130	Magnetite	Tudor, Ont	120
131	Hæmatite	Templeton, Que	127
132	Magnetite	Chandos, Ont	119
133	Magnetite	Palmerston, Ont	122
134	Magnetite	Wollaston, Ont	120
135	Magnetite	Wollaston, Ont	120
136	Magnetite	Wollaston, Ont	120
137	Magnetite	Wollaston, Ont	120
138	Magnetite and hæmatite	Portland, Ont	122
139	Magnetite	Belmont, Ont	119
140	Magnetite	Madoc, Ont	121
141	Magnetite	Bristol, Que	122

No.			Page.
142	Hæmatite	Madoc, Ont	125
143	Hæmatite	Belmont, Ont	125
144	Hæmatite	Palmerston, Ont	126
145	Magnetite	Darling, Ont	121
146	Magnetite	Bedford, Ont	121
147	Magnetite	Palmerston, Ont	122
148	Magnetite	Darling, Ont	122
149	Magnetite	Bagot, Ont	122
150	Granite	Gananoque, Ont	186
151	Arsenopyrite	Marmora, Ont	37
152	Auriferous quartz	Belmont, Ont	47
153	Auriferous quartz	Lake of the Woods, Ont	31
154	Auriferous quartz	Shoal Lake, Rainy River, Ont	32
155	Auriferous quartz	Lake of the Woods, Ont	30
156	Auriferous quartz	Upper Seine, Ont	34
157	Auriferous quartz	Jackfish Bay, Lake Superior, Ont	36
158	Auriferous quartz	Bald Indian Bay, Lake of the Woods, Ont	29
159	Auriferous quartz	Big Stone Bay, Lake of the Woods, Ont	29
160	Auriferous quartz	Shoal Lake, Lake of the Woods, Ont.	26
161	Phlogopite	Cawood, Pontiac, Que	169
162	Chalcopyrite, etc	Algoma, Ont	100
163	Felspar	South March, Ont	174
164	Felspar	Cameron, Nipissing, Ont	174
165	Talc	Madoc, Ont	176
166	Silver ore	Silver Mt., Thunder Bay, Ont	62
167	Silver ore	Porcupine Mine, Thunder Bay, Ont.	63
168	Silver ore	Rabbit Mt,, Thunder Bay, Ont	63
169	Native copper	Thunder Bay, Ont	87
170	Gypsum	Tobique, N.B	213
171	Auriferous quartz	Madoc, Ont	38
172	Auriferous quartz	Madoc, Ont	38
173	Hæmatite	Madoc, Ont	125
174	Hæmatite	Madoc, Ont	126
175	Galena and blende	Lake Tp., Hastings, Ont.	105
176	Chalcopyrite	Madoc, Ont	100
177	Mica	Hungerford, Ont.	169
178	Strontianite	Carleton Co., Ont.	160
179	Galena	Bannockburn, Ont.	104
180	Brecciated jasper	Hull, Que	192
181	Phlogopite	Wright, Que	170
182	Celestite	Bagot, Que	160
183	Chalcopyrite	George River, Cape Breton, N.S	102
184	Chalcopyrite	Ascot, Que	159
185	Sandstone	Salt Spring Island, B.C.	193
186	Sandstone	Newcastle, N.B	195
187	Sandstone	Nanaimo, B.C.	193
188	Sandstone	Glenville, N.S	196
189	Sandstone	Rockland, N.B.	195

No.			Page.
190	Granite	Jarvis Inlet, B.C.	185
191	Gold and silver ore	Thunder Bay, Ont	36
192	Hæmatite	Desert Lake, Algoma, Ont	124
193	Granite	Portneuf, Que	187
194	Magnetite	Palmerston, Ont	122
195	Hæmatite	Killarney, Ont	125
196	Magnetite	Dungannon, Ont	120
197	Auriferous quartz	Hammond Reef, Ont	34
198	Magnetite	Glamorgan, Ont	119
199	Magnetite	Dungannon, Ont	120
200	Chalcocite	Mamainse, Ont	99
201	Pyrrhotite, etc	Algoma, Ont	111
202	Celestite	Lansdowne, Ont	160
203	Hæmatite	Faraday, Ont	126
204	Native copper	Mamainse, Ont	87
205	Auriferous quartz	Frontenac, Ont	38
206	Hæmatite	Lanark, Ont	127
207	Blende	Zenith Mine, Thunder Bay, Ont	106
208	Auriferous iron-pyrites	Lake of the Woods, Ont	35
209	Auriferous iron-pyrites	Lake of the Woods, Ont	36
210	Auriferous quartz	Lake of the Woods, Ont	29
211	Auriferous quartz	Michipicoten, Ont	36
212	Auriferous quartz	Lake of the Woods, Ont	29
213	Auriferous quartz	Lake of the Woods, Ont	29
214	Gold ore containing pyrrhotite and copper-pyrites,	Lake of the Woods, Ont	31
215	Gold ore containing copper-pyrites	Lake of the Woods, Ont	31
216	Gold ore containing copper-pyrites	Lake of the Woods, Ont	31
217	Auriferous quartz	Lake of the Woods, Ont	29
218	Auriferous quartz	Michipicoten, Ont	36
219	Pyrrhotite	Worthington, Algoma, Ont	111
220	Mispickel (auriferous)	Actinolite, Ont	38
221	Chalcopyrite, etc	Algoma, Ont	110
222	Galena	Algoma, Ont	104
223	Sperrylite in gossan	Algoma, Ont	107
224	Bituminous shale	Baltimore, N.B.	151
225	Gypsum	Hillsborough, N.B	214
226	Stibnite	Prince William, N.B	109
227	Hæmatite	Jacksontown, N.B	127
228	Bog-iron ore	Burton, N.B	130
229	Pyrrhotite	St. Stephen, N.B.	113
230	Albertite	Albert, N.B	150
231	Auriferous quartz	Belmont, Ont	37
232	Chalcopyrite	Algoma, Ont	99
233	Galena	Algoma, Ont	104
234	Hæmatite	Cleveland, Que	127
235	Pyrrhotite	Algoma, Ont	110
236	Chalcopyrite	Algoma, Ont	110

No.	Specimen	Locality	Page.
237	Pyrrhotite	Algoma, Ont	110
238	Blende and pyrite (auriferous)	Leckie Mine, Ont	37
239	Magnetite	Madoc, Ont	121
240	Magnetite	Bagot, Ont	122
241	Auriferous quartz	New Klondike, Ont	35
242	Mispickel (auriferous)	Marmora, Ont	37
243	Pyrite and chalcopyrite	Capelton, Que	159
244	Muscovite	Escoumains, Que	171
245	Anthraxolite	Sudbury, Ont	150
246	Pyrolusite	Tenny Cape, N.S.	135
247	Pyrolusite	Markhamville, N.B	133
248	Manganite	Stellarton, N.S.	135
249	Auriferous quartz	Seine River, Ont	32
250	Dolomite and lime	Guelph, Ont	209
251	Dolomite and lime	Guelph, Ont	209
252	Limestone and lime	St. Mary's Ont	210
253	Limestone and lime	Dudswell, Que	211
254	Limestone and lime	Galt, Ont	209
255	Limestone and lime	Limehouse, Ont	210
256	Limestone and lime	Pakenham, Ont	210
257	Cement stone and cement	Thorold, Ont	209
258	Cement stone and cement	Queenston, Ont	209
259	Cement stone and cement	Limehouse, Ont	210
260	Shell marl	Caledon, Ont	213
261	Clay	Garrafraxa, Ont	213
262	Shell marl	Shallow Lake, Ont	213
263	Clay, clinker and cement	Shallow Lake, Ont	209
264	Infusorial earth	Bass River, N.S	181
265	Infusorial earth	Bass River, N.S	181
266	Salt	Sussex, N.B	166
267	Infusorial earth	St. John, N.B	180
268	Tar sands	Athabasca River, N.W.T	153
269	Muscovite	Yellow Head Pass, B.C	169
270	Magnesite	Bolton, Que	160
271	Auriferous quartz	Lake of the Woods, Ont	28
272	Auriferous quartz	Lake of the Woods, Ont	32
273	Auriferous quartz	Manitou Lake, Ont	31
274	Auriferous quartz	Rat Portage, Ont	28
275	Auriferous quartz	Lower Seine, Ont	32
276	Auriferous quartz	Lower Seine, Ont	33
277	Auriferous quartz	Lower Seine, Ont	33
278	Auriferous quartz	Lower Seine, Ont	33
279	Auriferous quartz	Lower Seine, Ont	33
280	Auriferous quartz	Lake of the Woods, Ont	29
281	Auriferous quartz	Rat-Portage, Ont	28
282	Auriferous quartz	Rat-Portage, Ont	28
283	Auriferous quartz	Lake of the Woods, Ont	29
284	Auriferous quartz	Lower Seine, Ont	32
285	Auriferous quartz	Lower Seine, Ont	33
286	Auriferous quartz	Manitou Lake, Ont	35

No.			Page.
287	Auriferous quartz	Lower Seine, Ont	34
288	Auriferous quartz	Lake of the Woods, Ont	28
289	Auriferous quartz	Manitou Lake	32
290	Auriferous quartz	Lower Seine, Ont	33
291	Hæmatite	Portland, Ont	162
292, 293	Limestone	Indiantown, N.B.	212
294	Dolomite	Indiantown, N.B	203
295	Infusorial earth	Chertsey Village, Que	180
296	Chromite	Bolton, Que	137
297	Chemawinite	Cedar Lake, Saskatchewan, N.W.T.	184
298	Clay, iron-stone	Edmonton, N.W.T.	131
299	Flagstone	Dudswell, Que	195
300	Apatite	N. Burgess, Ont	161
301	Grey granite	Spoon Island, N.B	188
302	Serpentine	St. John, N.B	191
303	Diorite	St. Andrews, N. B	189
304	Phlogopite	N. Burgess, Ont	169
305	Magnetite	Lavant, Ont	121
306	Phlogopite	Huil, Que	169
307	Chromite	South Ham, Que	137
308	Auriferous schist	Lake of the Woods, Ont	28
309	Auriferous quartz	Lake of the Woods, Ont	28
310	Auriferious quartz	Seine River, Ont	34
311	Sandstone	Wood Point, N.B	196
312	Sandstone	Sackville, N.B	196
313	Sandstone	Rockport, N.B	196
314	Bog-iron ore	St. Malo Range, Que	162
315	Mica	Templeton, Que	170
316	Iron sand	Moisie, Que	132
317	Galena	Algoma, Ont	104
318	Bornite	Parry Sound, Ont	100
319	Chromite	Black Lake, Que	137
320	Blende	Calumet Island, Que	106
321	Molybdenite	Harcourt, Ont	138
322	Natural tar	Athabasca River, N.W.T	153
323	Specular iron ore	Harvey Hill, Que	127
324	Chalcopyrite	Algoma, Ont	99
325	Mica	Villeneuve, Que	170
326	Antimony	South Ham, Que	109
327	Graphite	Grenville, Que	173
328	Limestone and Lime	Beauport, Que	211
329	Pyrrhotite	Nipissing, Ont	111
330	Chalcopyrite, etc	Nipissing, Ont	111
331	Magnetite	Belmont Mine, Ont	119
332	Limestone and lime	St. John, N.B	212
333	Galena	Calumet Island, Que	105
334	Asbestus	Coleraine, Que	168
335	Copper ore	South Ham, Que	101
336	Pyrite	South Ham, Que	100
337	Chromite	South Ham, Que	137

No.			Page.
338	Magnetite, etc	South Ham, Que	123
339	Lithographic stone	Madoc, Ont	183
340	Galena	Cape Breton, N.S	106
341	Cement stone	Quebec City, Que	211
342	Garnet rock	Wakefield, Que	181
343	Mica	Hull, Que	170
344	Pyrrhotite	Calumet Island, Que	112
345	Petroleum	Bothwell, Ont.	157
346	Petroleum	Petrolia, Ont	156
347	Petroleum	Oil Springs, Ont	156
347a	Petroleum products	Sarnia, Ont	157
348	Magnetite	Leeds, Que	123
349	Coal	Newcastle, N.B	145
350	Felspar	Villeneuve, Que	175
351	Chromic iron ore	Black Lake, Que	137
352	Bog-iron ore	Three Rivers, Que	115
353	Porous terra cotta bricks, etc	Montreal, Que	217
354	Phlogopite	Templeton, Que	170
355	Apatite	Templeton, Que	161
356	Pulp-stone (sandstone)	Newcastle, N.B	180
357	Mica	Portland, Que	170
358	Auriferous quartz	Lake of the Woods, Ont	27
359	Auriferous quartz	Lake of the Woods, Ont	27
360	Auriferous quartz	Lake of the Woods, Ont	31
361	Auriferous quartz	Lake of the Woods, Ont	30
362	Auriferous quartz	Lake of the Woods, Ont	27
363	Auriferous quartz	Lake of the Woods, Ont	26
364	Auriferous quartz	Lake of the Woods, Ont	27
365	Auriferous quartz	Lake of the Woods, Ont	30
366	Auriferous quartz	Lake of tne Woods, Ont	30
367	Auriferous quartz	Lake of the Woods, Ont	29
368	Pyrrhotite	Sudbury Ont.	111
369	Chalcopyrite	Sudbury, Ont	111
370	Pyrrhotite and chalcocite	Sudbury, Ont	111
371	Platinum and palladium ore	Sudbury, Ont	107 and 111
372	Lithia mica	Wakefield Que	161
373	Corundum	Raglan, Ont	177
374	Coal	Nanaimo, B.C	140
375	Pyrrhotite	Rossland, B.C	49
376	Pyrrhotite	Rossland, B.C	49
377	Chalcopyrite	Rossland, B.C	51
378	Chalcopyrite	Rossland, B.C	48
379	Pyrrhotite and chalcopyrite	Rossland, B.C	49
380	Pyrite	Rossland, B.C	58
381	Chalcopyrite	Rossland, B.C	50
382	Pyrrhotite	Rossland, B.C	50
383	Chalcopyrite	Rossland, B.C	48
384	Chalcopyrite	Rossland, B.C	53
385	Chalcopyrite and pyrrhotite	Rossland, B.C	52

No.			Page.
386	Pyrrhotite, pyrite and chalcopyrite	Rossland, B.C.	49
387	Chalcopyrite	Rossland, B.C.	50
388	Pyrite, galena and blende	Rossland, B.C.	51
389	Ferruginous argillite	Nelson, B.C.	23
390	Pyrite	Wolf Creek, Nelson, B.C.	24
391	Pyrite	Ymir, Nelson, B.C.	23
392	Pyrite	Ymir, Nelson, B.C.	23
393	Pyrrhotite	Ymir, Nelson, B.C.	23
394	Pyrrhotite and pyrite	Ymir, Nelson, B.C.	48
395	Pyrrhotite	Ymir, Nelson, B.C.	48
396	Gold ore	Ymir, Nelson, B.C.	23
397	Galena	Ymir, Nelson, B.C.	74
398	Galena and pyrite	Ymir, Nelson, B.C.	22
399	Chalcocite	Nelson, B.C.	84
400	Tetrahedrite	Windermere, B.C.	85
401	Chalcopyrite	Nelson B.C	84
402	Galena and blende	Salmo, Nelson, B.C	74
403	Chalcopyrite	Nelson, B.C	84
404	Pyrite	Ymir, Nelson, B.C	23
405	Galena	Salmo, Nelson, B.C	74
406	Chalcocite	Goat River, B.C	59
407	Pyrrhotite	Ymir, Nelson, B.C.	52
408	Galena and pyrite	Nelson, B.C.	24
409	Galena	Ainsworth, B.C.	71
410	Chalcopyrite	Goat River, B.C	59
411	Chalcocite	Nelson, B.C.	84
412	Pyrite	Ymir, Nelson, B.C	22
413	Pyrrhotite, etc.	Rossland, B.C	49
414	Chalcopyrite and galena	Rossland, B.C	50
415	Pyrrhotite and chalcopyrite	Rossland, B.C	52
416	Chalcopyrite and pyrrhotite	Rossland, B.C	49
417	Pyrrhotite and chalcopyrite	Rossland, B.C	51
418	Pyrrhotite and chalcopyrite	Rossland, B.C	49
419	Pyrrhotite and chalcopyrite	Rossland, B.C	49
420	Chalcopyrite	Rossland, B.C	52
421	Pyrite	Rossland, B.C	53
422	Galena	Ainsworth, B.C	71
423	Galena	Ainsworth, B.C	74
424	Chalcopyrite and malachite	Rossland, B.C	51
425	Pyrrhotite and arsenopyrite	Rossland, B.C	48
426	Chalcopyrite and pyrite	Nelson, B.C.	21
427	Galena	Slocan, B.C.	68
428	Galena	Slocan, B.C.	67
429	Quartz with silver sulphides	Silverton, B.C	62
430	Gold quartz	Toad Mt., Nelson, B.C.	21
431	Pyrrhotite	Ymir, Nelson, B.C.	23
432	Galena and pyrite	Ymir, Nelson, B.C	22
433	Galena and pyrite	Ymir, Nelson, B.C	22
434	Quartz and pyrite	Toad Mt., Nelson, B.C.	21

No.			Page.
435	Marble	Kootenay Lake, B.C	204
436	Galena	Slocan, B.C	70
437	Gold ore	Nelson, B.C	24
438	Pyrrhotite and chalcopyrite	Ymir, Nelson, B.C	23
439	Quartz and chalcopyrite	Nelson, B.C	84
440	Gold-bearing pyrite	Ymir, Nelson, B.C	23
441	Galena	Ainsworth, B.C	74
442	Chalcopyrite in quartz	Hall Creek, Nelson, B.C	22
443	Argentiferous pyrite in quartz	Slocan, B.C	62
444	Galena	Silverton, Slocan, B.C	67
445	Galena	Slocan City, B.C	70
446	Galena	Slocan B.C	69
447	Galena	Ainsworth, B.C	73
448	Galena	Ainsworth, B.C	70
449	Galena	Ainsworth, B.C	73
450	Galena	Ainsworth, B.C	73
451	Galena	Ainsworth, B.C	73
452	Galena	Ainsworth, B.C	73
453	Chalcopyrite, etc	Ainsworth, B.C	82
454	Blende	Ainsworth, B.C	74
455	Chalcopyrite	Ainsworth, B.C	58
456	Galena	Silverton, B.C	67
457	Galena	Silverton, B.C	68
458	Pyrrhotite	Silverton, B.C	48
459	Galena	Silverton, B.C	68
460	Galena	Ainsworth, B.C	73
461	Galena	Ainsworth, B.C	73
462	Galena	Ainsworth, B.C	73
463	Galena	Ainsworth, B.C	72
464	Chalcopyrite	Grand Forks, B.C	93
465	Chalcopyrite	Grand Forks, B.C	57
466	Pyrrhotite	Grand Forks, B.C	47
467	Chalcopyrite and pyrrhotite	Grand Forks, B.C	93
468	Chalcopyrite	Kettle River, B.C	92
469	Cupriferous quartz	Grand Forks, B.C	20
470	Quartz and pyrite	Grand Forks, B.C	20
471	Chalcopyrite with pyrrhotite	Grand Forks, B.C	46
472	Pyrrhotite	Grand Forks, B.C	93
473	Chalcopyrite	Grand Forks, B.C	92
474	Chalcopyrite	Grand Forks, B.C	93
475	Chalcopyrite	Grand Forks, B.C	57
476	Pyrite and pyrrhotite	Grand Forks, B.C	46
477	Pyrrhotite	Grand Forks, B.C	93
478	Pyrrhotite	Grand Forks, B.C	47
479	Galena	Ainsworth, B.C	71
480	Galena	Ainsworth, B.C	70
481	Galena	Slocan, B.C	69
482	Galena	Slocan, B.C	70
483	Pyrite	Kettle River, B.C	20
484	Pyrite	Grand Forks, B.C	46

No.			Page.
485	Chalcopyrite	Grand Forks, B.C	46
486	Pyrrhotite and chalcopyrite	Kettle River, B.C	46
487	Pyrrhotite and chalcopyrite	Grand Forks, B.C	46
488	Chalcopyrite	Forty-nine Creek, Nelson, B.C	94
489	Ferruginous quartz	Nelson, B.C	21
490	Galena	Ainsworth, B.C	74
491	Galena	Ainsworth. B.C	73
492	Galena	Ainsworth, B.C	73
493	Galena	Ainsworth, B.C	72
494	Galena	Ainsworth, B.C	72
495	Galena	Slocan, B.C	69
496	Galena	Slocan, B.C	68
497	Blende	Ainsworth, B.C	72
498	Galena	Ainsworth, B.C	72
499	Magnetite with chalcopyrite	Kettle River, B.C	92
500	Magnetite with chalcopyrite	Grand Forks, B.C	46
501	Galena	Slocan, B.C	69
502	Galena	Slocan, B.C	67
503	Galena	Slocan, B.C	68
504	Galena	Ainsworth, B.C	71
505	Bornite and chalcopyrite	Texada Island, B.C	55
506	Auriferous quartz	Lillooet, B.C	17
507	Chalcopyrite	Vancouver Island, B.C	56
508	Chalcopyrite	Vancouver Island, B.C	56
509	Bornite and chalcopyrite	Texada Island, B.C	55
510	Copper matte	Taxada Island, B.C	55
511	Bornite and chalcopyrite	Texada Island, B.C	55
512	Galena and quartz	Ymir, Nelson, B.C	22
513	Galena and quartz	Ymir, Nelson, B.C	22
514	Chalcopyrite	Nelson, B.C	22
515	Pyrrhotite	Arrow Lake, B.C	47
516	Galena	Arrow Lake, B.C	67
517	Pyrrhotite, etc	Arrow Lake, B.C	48
518	Galena	Slocan, B.C	69
519	Galena	Ainsworth, B.C	71
520	Galena	Ainsworth, B.C	72
521	Galena and blende	Ainsworth, B.C	72
522	Galena and native silver	Ainsworth, B.C	72
523	Galena and pyrite	Trout Lake, B.C	66
524	Galena and tetrahedrite	Trout Lake, B.C	65
525	Galena	Trout Lake, B.C	66
526	Galena	Trout Lake, B.C	67
527	Galena and tetrahedrite	Trout Lake, B.C	65
528	Chalcopyrite	Trout Lake, B.C	57
529	Galena, pyrite, etc	Trout Lake, B.C	65
530	Galena	Trout Lake, B.C	66
531	Cupriferous quartz and galena	Trout Lake, B.C	67
532	Galena	Trout Lake, B.C	66
533	Galena	Trout Lake, B.C	66
534	Galena, magnetite, etc	Trout Lake, B.C	65

No.			Page.
535	Galena	Trout Lake, B.C.	66
536	Galena	Trout Lake, B.C.	66
537	Galena, pyrite, etc	Trout Lake, B.C.	57
538	Quartz with pyrite	Nanaimo, B.C.	17
539	Galena	Trout Lake, B.C.	65
540	Galena and tetrahedrite	Trout Lake, B.C.	65
541	Pyrite, arsenopyrite, etc	Arrow Lake B.C.	21
542	Siderite	Trout Lake, B.C.	21
543	Tetrahedrite, galena, etc.	Trout Lake, B.C.	67
544	Galena	Ainsworth, B.C.	71
545	Malachite	Mount Skeena, B.C.	89
546	Chalcopyrite and pyrite	Alberni, B.C.	87
547	Sulphides	Kettle River, B.C.	57
548	Bornite	Skeena, B.C	89
549	Chalcopyrite	Fort Steele, B.C.	98
550	Ferruginous veinstone	Fort Steele, B.C.	26
551	Tetrahedrite	Fort Steele, B.C.	99
552	Gold ore	Fort Steele, B.C.	25
553	Galena	Fort Steele, B.C.	81
554	Galena	Fort Steele, B.C.	81
555	Pyrrhotite and chalcopyrite	Rossland, B.C.	52
556	Chalcopyrite	Goat River, B.C.	59
557	Chalcopyrite	Goat River, B.C.	59
558	Malachite	Goat River, B.C.	94
559	Galena	Goat River, B.C.	75
560	Galena and chalcopyrite	Goat River, B.C.	59
561	Galena and chalcopyrite	Goat River, B.C.	59
562	Chalcopyrite	Goat River, B.C.	58
563	Galena and chalcopyrite	Goat River, B.C	94
564	Cobalt bloom	Goat River, B.C.	113
565	Hæmatite	Goat River, B.C.	124
566	Tetrahedrite, etc	Goat River, B.C.	58
567	Tetrahedrite	Goat River, B.C.	58
568	Pyrrhotite, etc	Goat River, B.C.	94
569	Galena	Goat River, B.C.	75
570	Chalcopyrite	Goat River, B.C.	59
571	Chalcopyrite	Goat River, B.C	58
572	Chalcopyrite	Goat River, B.C.	59
573	Chalcopyrite	Goat River, B.C	59
574	Cupriferous quartz	Goat River, B.C	94
575	Galena, etc	Goat River, B.C	58
576	Galena	Goat River, B.C	75
577	Galena	Goat River, B.C	75
578	Galena and chalcopyrite	Goat River, B.C	58
579	Galena	Goat River, B.C	75
580	Galena	Goat River, B.C	75
581	Chalcopyrite and galena	Goat River, B.C	94
582	Galena	Goat River, B.C	75
583	Galena and pyrite	Goat River, B.C	75
584	Chalcopyrite	Goat River, B.C	58

No.			Page.
585	Coal	Nanaimo, B.C.	140
586	Chalcopyrite and pyrrhotite	Rossland, B.C.	51
587	Pyrite	Nelson, B.C	21
588	Galena	Ainsworth, B.C	72
589	Galena	Slocan, B.C	69
590	Pyrrhotite and chalcopyrite	Rossland, B.C	52
591	Pyrrhotite and chalcopyrite	Rossland, B.C	52
592	Pyrrhotite and chalcopyrite	Rossland, B.C.	51
593	Pyrrhotite	Rossland, B.C.	50
594	Bornite and chalcopyrite	Nelson, B.C.	82
595	Chalcopyrite with pyrrhotite	Rossland, B.C	50
596	Chalcopyrite with pyrrhotite	Grand Forks, B.C	92
597	Chalcopyrite and pyrrhotite	Grand Forks, B.C	47
598	Pyrite, etc	Grand Forks, B.C	93
599	Chalcopyrite	Grand Forks, B.C	93
600	Galena	Ainsworth, B.C	71
601	Galena	Ainsworth, B.C	72
602	Galena	Slocan, B.C	69
603	Galena	Slocan, B.C	69
604	Galena	Slocan, B.C	70
605	Chalcopyrite	Kettle River, B.C	91
606	Auriferous quartz	McKinney Camp, B.C	18
607	Auriferous quartz	McKinney Camp, B.C	19
608	Auriferous quartz	McKinney Camp, B.C	19
609	Pyrite, etc	McKinney Camp, B.C	18
610	Auriferous quartz	McKinney Camp, B.C	18
611	Galena and pyrite	McKinney Camp, B.C	18
612	Galena and pyrite	McKinney Camp, B.C	19
613	Galena and pyrite	McKinney Camp, B.C	19
614	Auriferous quartz	Arrow Lake, B.C.	48
615	Chalcopyrite and magnetite	Grand Forks, B.C	47
616	Chalcopyrite	Kettle River, B.C	91
617	Galena with chalcopyrite	Grand Forks, B.C	47
618	Chalcopyrite and hæmatite	Grand Forks, B.C	47
619	Chalcopyrite, etc	Kettle River, B.C	92
620	Chalcopyrite, etc	Kettle River, B.C	91
621	Pyrrhotite and chalcopyrite	Kettle River, B.C	46
622	Pyrrhotite and chalcopyrite	Grand Forks, B.C	46
623	Cuprite and malachite	Kettle River, B.C	82
624	Chalcopyrite	Kettle River, B.C	92
625	Cuprite and malachite	Kettle River, B.C	57
626	Tellurides of gold and silver	Long Lake Camp, B.C.	19
627	Tellurides of gold and silver	Long Lake Camp, B.C.	19
628	Tellurides of gold and silver	Long Lake Camp, B.C.	19
629	Native silver, etc	Kettle River, B.C	81
630	Chalcopyrite	Kettle River B.C.	91
631	Chalcopyrite	Grand Forks	57
632	Molybdenite	Kamloops, B.C.	138
633	Chalcopyrite	Kamloops. B.C.	89
634	Cinnabar	Kamloops, B.C.	108

No.			Page.
635	Chalcopyrite	Kamloops, B.C	90
636	Native copper	Kamloops, B.C	90
637	Bornite, etc	Kamloops, B.C	90
638	Bornite	Kamloops, B.C	90
639	Chalcocite	Kamloops, B.C	90
640	Chalcopyrite	Kamloops, B.C	91
641	Chalcopyrite	Kamloops, B.C	89
642	Chalcopyrite	Kamloops, B.C	90
643	Chalcopyrite	Kamloops, B.C	90
644	Magnetite	Kamloops, B.C	118
645	Pyrrhotite	Kamloops, B.C	91
646	Magnetite	Kamloops, B.C	118
647	Coal	Kamloops, B.C	141
648	Chalcopyrite	Kamloops, B.C	90
649	Magnetite, etc	Jacko Lake, Kamloops, B.C	118
650	Galena and pyrite	Kamloops, B.C	57
651	Chalcopyrite, etc	Kamloops, B.C	91
652	Chalcopyrite, etc	Kamloops, B.C	91
653	Galena and pyrite	Kamloops, B.C	56
654	Pyrite	Kamloops, B.C	90
655	Pyrite, galena and chalcopyrite	Kamloops, B.C	57
656	Chalcopyrite	Kamloops, B.C	89
657	Pyrite	Kamloops, B.C	17
658	Galena	Kamloops, B.C	56
659	Magnetite	Kamloops, B.C	118
660	Auriferous quartz	Kamloops, B.C	18
661	Chalcopyrite with magnetite, etc.	Kamloops, B.C	90
662	Chalcopyrite,	Kamloops, B.C	91
663	Chalcopyrite	Kamloops, B.C	90
664	Pyrrhotite, etc	Denison Township, Ont	112
665	Salt	Wingham, Ont	165
666	Salt	Exeter, Ont	165
667	Salt	Parkhill, Ont	166
668	Salt	Clinton, Ont	166
669	Black granite	Gananoque, Ont	186
670	Serpentine	Grenville, Que	206
671	Sandstone	Nepean, Ont	195
672	Auriferous quartz	Clarendon, Ont	39
673	Auriferous quartz	Frontenac, Ont	38
674	Pyrrhotite	Sudbury, Ont	112
675	Limonite and hæmatite,	Michipicoten, Ont	125
676	Bricks and shale	Laprairie, Que	217
677	Phlogopite	Hull, Que	169
678	Auriferous quartz, etc	Elzevir Tp., Ont	38
679	Bricks and shale	Humber River, Ont	217
680	Lignite	Yukon River, N.W.T	142
681	Coal	Lethbridge, N.W.T	143
682	Chalcopyrite	Vancouver Island, B.C	54
683	Chalcopyrite	Vancouver Island, B.C	88
684	Chalcopyrite	Vancouver Island, B.C	55

No.			Page.
685	Galena and pyrite	Granite Creek, Alberni, B.C	54
686	Chalcopyrite, etc	Vancouver Island, B.C	55
687	Chalcopyrite and pyrrhotite	Alberni, B.C	88
688	Bornite	Vancouver Island, B.C	54
689	Auriferous and argentiferous qtz.	New Westminster, B.C	17
690	Chalcopyrite	Vancouver Island, B.C	56
691	Chalcopyrite	Hiwatches Creek, Alberni, B.C	54
692	Chalcopyrite	Vancouver Island, B.C	88
693	Auriferous pyrite	Alberni, B.C	16
694	Chalcopyrite	Vancouver Island, B.C	54
695	Chalcopyrite	Vancouver Island, B.C	88
696	Auriferous pyrite	Alberni, B.C	16
697	Magnetite, chalcopyrite, etc	Vancouver Island, B.C	88
698	Chalcopyrite	Vancouver Island, B.C	89
699	Chalcopyrite and pyrite	Alberni, B.C	88
700	Chalcopyrite	Vancouver Island, B.C	88
701	Chalcopyrite	Vancouver Island, B.C	88
702	Auriferous pyrite	Alberni, B.C	17
703	Magnetite	Barclay Sound, B.C	117
704	Chalcopyrite and pyrite	Vancouver Island, B.C	54
705	Chalcopyrite and pyrite	Vancouver Island, B.C	88
706	Chalcopyrite	Vancouver Island, B.C	88
707	Magnetite, etc	Texada Island, B.C	55
708	Chalcopyrite	Texada Island, B.C	55
709	Bornite and chalcopyrite	Texada Island, B.C	56
710	Chalcopyrite	Texada Island, B.C	56
711	Magnetite, with chalcopyrite	Texada Island, B.C	55
712	Chalcopyrite, etc	Texada Island, B.C	56
713	Smelted copper	Texada Island, B.C	55
714	Galena	Slocan, B.C	67
715	Galena and chalcopyrite	Nelson, B.C	22
716	Galena	Slocan, B.C	69
717	Galena	Slocan, B.C	67
718	Gold ore	Nelson, B.C	21
719	Coal	Souris, N.W.T	144
720	Galena, tetrahedrite, etc	Kamloops, B.C	57
721	Galena	Goat River, B.C	74
722	Coal	Michel Creek, B.C	142
723	Coal	Coal Creek. B.C	142
724	Coke	Fernie, B.C	142
725	Arsenopyrite and pyrite	Lake Temagami, Ont	37
726	Pyrrhotite, etc	Lake Temagami, Ont	112
727	Cinnabar	Kamloops, B.C	108
728	Dolomite	St. John, N.B	212
729	Sandstone	Saturna Island, B.C	193
730	Sandstone	Koksaila Island, B.C	193
731	Sandstone	Nanaimo, B.C	193
732	Granite	Jarvis Inlet, B.C	185
733	Granite	New Westminister, B.C	185
734	Limestone	Alberni, B.C	198

No.			Page.
735	Quartz-andesite	Haddington Island, B.C	191
736	Marble	Texada Island, B.C	198
737	Auriferous quartz	Lake of the Woods, Ont	30
738	Auriferous pyrite	Lake of the Woods, Ont	30
739	Limestone and lime	Renfrew, Ont	210
740	Galena	Lardeau, B.C	65
741	Galena	Lardeau, B.C	65
742	Galena	Lardeau, B.C	65
743	Galena	Lardeau, B.C	65
744	Auriferous pyrite	Revelstoke, B.C	20
745	Auriferous quartz	Revelstoke, B.C	20
746	Auriferous pyrite	Revelstoke, B.C	21
747	Arsenopyrite	Revelstoke, B.C	47
748	Galena	Revelstoke, B.C	64
749	Auriferous pyrite	Revelstoke, B.C	20
750	Chalcopyrite	Revelstoke, B.C	93
751	Auriferous quartz	Revelstoke, B.C	20
752	Auriferous quartz	Revelstoke, B.C	2c
753	Auriferous quartz	Revelstoke, B.C	21
754	Chalcopyrite	Revelstoke, B.C	93
755	Auriferous quartz	Revelstoke, B.C	20
756	Chromite	Wolfe, Que	137
757	Chromite	Megantic, Que	137
758	Limestone	Thurlow, Ont	200
759	Gold ore contain'g copper-pyrites	Thunder Bay, Ont	31
760	Peat	Miramichi Bay, N.B	152
761	Pyrrhotite	Bolton, Que	113
762	Salt	Windsor, Ont	165
763	Hæmatite and chalcopyrite	Kettle River, B.C	92
764	Tetrahedrite in quartz	Slocan, B.C	62
765	Quartzite with pyrrhotite	Nelson, B.C	48
766	Gold and silver ores	Nelson, B.C	23
767	Sandstone	Sault Ste. Marie, Ont	194
768	Granite	Point Brulé Harbour, Ont	186
769	Granite	Point Brulé Harbour, Ont	186
770	Limestone	Hull, Que	210
771	Cement	Hull, Que	211
772	Limestone	Cookstown, Ont	202
773	Galena	Fort Steele, B.C	79
774	Galena	Fort Steele, B.C	80
775	Tetrahedrite in quartz	Fort Steele, B.C	98
776	Chalcopyrite and bornite	Fort Steele, B.C	98
777	Chalcopyrite and limonite	Fort Steele, B.C	99
778	Auriferous quartz	Fort Steele, B.C	26
779	Galena	Fort Steele, B.C	80
780	Galena	Fort Steele, B.C	80
781	Galena	Fort Steele, B.C	80
782	Chalcocite	Fort Steele, B.C	86
783	Auriferous quartz	Fort Steele, B.C	25
784	Pyrrhotite and chalcopyrite	Fort Steele, B.C	86

No.			Page.
785	Pyrrhotite and galena	Fort Steele, B.C	95
786	Quartz with chalcopyrite	Fort Steele, B.C	98
787	Tetrahedrite	Fort Steele, B.C	99
788	Tetrahedrite in quartz	Fort Steele, B.C	97
789	Galena	Fort Steele, B.C	79
790	Tetrahedrite, galena and chalcopyrite	Fort Steele, B.C	60
791	Tetrahedrite	Fort Steele, B.C	98
792	Tetrahedrite	Fort Steele, B.C	99
793	Hæmatite	Darling, Ont	126
794	Gypsum	Hillsborough, N.B	214
795	Grindstone	Gloucester Junction, N.B	180
796	Granite	St. George, N.B	189
797	Asbestus	Danville, Que	167
798	Chalcopyrite	Windermere, B.C.	96
799	Tetrahedrite and galena	Windermere, B.C	79
800	Chalcocite	Wentworth, N.S.	103
801	Pyrolusite	Tenny Cape, N.S	135
802	Magnetite	Mira River, Cape Breton, N.S.	124
803	Graphite	Inverness County, Cape Breton, N.S.	173
804	Chalcopyrite	French Road, Cape Breton, N.S.	102
805	Hæmatite	Sydney, Cape Breton, N.S.	129
806	Manganite	Sydney, Cape Breton, N.S.	135
807	Barytes	Middle Stewiacke, N.S	163
808	Barytes	Lake Ainsley, N.S	163
809	Barytes crushed	Lake Ainsley, N.S	163
810	Magnetite	George River, Cape Breton, N.S	124
811	Hæmatite	George River, Cape Breton, N.S	129
812	Magnetite	George River, Cape Breton, N.S	124
813	Hæmatite	North Sydney, Cape Breton, N.S.	129
814	Wolframite in quartz	Emerald Bay, N.S.	138
815	Manganite	New Ross, Lunenburg County, N.S.	136
816	Chalcopyrite	Antigonish, N.S.	103
817	Gypsum	Windsor, N.S	215
818	Sandstone	River John, N.S.	197
819	Stibnite (auriferous)	West Gore, N.S.	44 & 109
820	Sandstone	River John, N.S.	197
821	Chalcopyrite	Colchester, N.S	103
822	Chalcopyrite with specular iron	Antigonish, N.S.	102
823	Auriferous quartz	Renfrew, N.S	44
824	Auriferous quartz	Waverley. N. S	42
825	Auriferous quartz	Montague, N.S	42
826	Pyrolusite	New Ross, N.S	136
827	Auriferous quartz	Wine Harbour, N.S	41
828	Chalcopyrite	Coxheath, N.S.	102
829	Sandstone	Wallace, N.S	196
830	Magnetite	Middleton, N.S.	123
831	Hæmatite	Torbrook, N.S.	123
832	Magnetite	Middleton, N.S	124
833	Magnetite	East Brooklyn, N.S.	128

No.			Page.
834	Magnetite	Middleton, N.S	123
835	Magnetite	Middleton, N.S	123
836	Hæmatite	Wilmot Station, N.S	128
837	Hæmatite	Annapolis, N.S	129
838	Hæmatite	Torbrook, N.S	128
839	Magnetite	Middleton, N.S	123
840	Specular iron ore	Nictaux dist., N.S	127
841	Galena and pyrite	Cheticamp, N.S	105
842	Auriferous quartz	Isaacs Harbour, N.S	40
843	Fire-clay	Brooklyn, N.S	173
844	Galena, etc	Cheticamp, N.S	106
845	Chalcopyrite	Cheticamp, N.S	102
846	Chalcopyrite and zinc blende	Cheticamp, N.S	102
847	Manganite	New Ross, N.S	136
848	Limonite	East River, N.S	131
849	Hæmatite	Torbrook, N.S	128
850	Magnetite	Daiguire, Cuba	129
851	Hæmatite	Wabana, Newfoundland	129
852	Limonite	East River, N.S	131
853	Limestone	Springville, N.B	212
854	Pig Iron	New Glasgow, N.S	116
855	Manganite	East River, N.S	135
856	Manganiferous limonite	East River, N.S	131
857	Bog manganese	Hillsborough, N.B	134
858	Sandstone	Pugwash, N.S	197
859	Sandstone	Pugwash, N.S	197
860	Selenite	Enfield, N.S	215
861	Sandstone	Wallace, N.S	196
862	Graphite	Cape Breton, N.S	173
863	Galena	Smithfield, N.S	105
864	Auriferous quartz	South Uniacke, N.S	43
865	Gold concentrates	Goldenville, N.S	40
866	Auriferous quartz	Caribou, N. S	41
867	Auriferous quartz	Cow Bay, N.S	43
868	Auriferous quartz	Leipsigate, N.S	44
869	Auriferous quartz	Caribou, N.S	42
870	Auriferous quartz	Salmon River, N.S	43
871	Chalcopyrite	Polsons Lake, N.S	102
872	Argentiferous galena	Smithfield, N.S	105
873	Auriferous quartz	South Uniacke, N.S	43
874	Auriferous quartz	Waverly, N.S	42
875	Auriferous quartz	Molega Barrens, N.S	45
876	Auriferous quartz	Laurencetown, N.S	41
877	Galena	Cheticamp, N.S	105
878	Auriferous quartz	Brookfield, N.S	45
879	Auriferous slate with arsenopyrite	Cranberry Head, N.S	44
880	Auriferous quartz	Laurencetown, N.S	41
881	Auriferous quartz	Montague, N.S	42
882	Auriferous rock	Laurencetown, N.S	41

No.			Page.
883	Gold (case of nuggets)	Montague, N.S.	42
884	Coal shale	North Sidney, C.B.	151
885	Coal	Springhill, N.S.	149
886	Coal	Stellarton, N.S.	147
887	Coal	North Sidney, C.B.	145
888	Coal	Chignecto, N.S.	150
889	Iron ores	Londonderry, N.S.	131
890	Gold concentrates	Leipsigate, N.S.	44
891	Copper ore	New Annan, N.S.	103
892	Gypsum	Windsor, N.S.	215
893	Gypsum	Newport, N.S.	215
894	Gypsum	Windsor, N.S.	215
895	Gypsum	Wentworth, N.S.	215
896	Wall-rock	Laurencetown, N.S.	41
897	Gypsum products	Windsor, N.S.	215
898	Photographs	North Brookfield, N.S.	45
899	Chalcopyrite	Port-au-Pique, N.S.	103
900	Tripolite	Bass River, N.S.	181
901	Sandstone	Eight-mile Brook, N.S.	197
902	Auriferous quartz	Mount Uniacke, N.S.	44
903	Quartz, (3 spec.) val. $100	Nova Scotia	45
904	Marble	Escasoni, C.B.	208
905	Gypsum	Newport, N.S.	215
906	Chalcopyrite	George's River, C.B.	102
907	Sandstone	Cumberland Basin, N.S.	180, 197
908	Coal	Joggins, Cumberland Co.	149
909	Felsite	Coxheath Hills, C.B.	174
910	Coal	Stellarton, N.S.	148
911	Molybdenite	New Ross, N.S.	138
912	Sandstone	Eight-mile Brook, Pictou, N.S.	197
913	Gold specimen	Montague, N.S.	43
914	Tripolite	St. Anns, C.B.	181
915	Iron ores	Whycocomagh, C.B.	124
921	Galena, chalcopyrite and pyrite	McMurdo Creek, Golden, B.C.	85
922	Galena and chalcopyrite	Toby Creek, Windermere, B.C.	78
923	Galena	Toby Creek, Windermere, B.C.	78
924	Galena	Bug-a-boo Creek, Golden, B.C.	77
925	Chalcopyrite, tetrahedrite and galena	Dutch Creek, Windermere, B.C.	85
926	Chalcopyrite and bornite	Boulder Creek, Windermere B.C.	97
927	Galena	Boulder Creek, Windermere, B.C.	79
928	Galena	Law Creek, Windermere, B.C.	79
929	Galena	Toby Creek, Windermere, B.C.	78
930	Chalcopyrite	No. 2 Creek, Windermere, B.C.	96
931	Galena	Toby Creek, Windermere, B.C.	78
932	Chalcopyrite	Horse-thief Creek, Windermere, B.C.	96
933	Galena	No. 2 Creek, Windermere, B.C.	77
934	Galena	Toby Creek, Windermere, B.C.	78
935	Galena	Toby Creek, Windermere, B.C.	78

No.			Page.
936	Galena	Law and McDonald Creeks, Windermere, B.C	78
937	Galena	Toby Creek, Windermere, B.C	78
938	Galena	Law Creek, Windermere, B.C	79
939	Tetrahedrite	Toby Creek, Windermere, B.C	78
940	Galena	Toby Creek, Windermere, B.C	78
941	Chalcopyrite	Dutch Creek, Windermere, B.C	96
942	Chalcopyrite	Dutch Creek, Windermere, B.C	96
943	Cupriferous veinstone	Mt. Windermere, Windermere, B.C	97
944	Chalcocite	Mt. Windermere, Windermere, B.C	97
945	Malachite	Mt. Windermere, Windermere, B.C	97
946	Tetrahedrite and malachite	Mt. Windermere, Windermere, B.C	97
947	Azurite and malachite	Mt. Windermere, Windermere, B.C	97
948	Chalcopyrite	Boulder Creek, Windermere, B.C	97
949	Galena	Vermont Creek, Golden, B.C	76
950	Pyrite in quartz	Upper Columbia Lake, Windermere, B.C	25
951	Galena	Vermont Creek, Golden, B.C	76
952	Galena and pyrite	Vermont Creek, Golden, B.C	76
953	Chalcopyrite	Vermont Creek, Golden, B.C	95
954	Pyrite and chalcopyrite	Vermont Creek, Golden, B.C	95
955	Galena and tetrahedrite	Spillimachene, Golden, B.C	76
956	Tetrahedrite	Boulder Creek, Windermere, B.C	97
957	Pyrite in quartz	Burns Basin, Golden, B.C	25
958	Pyrite in quartz	Spillimachene, Golden, B.C	25
959	Galena	Spillimachene, Golden, B.C	76
960	Chalcopyrite and pyrite	Spruce Tree Creek, Golden, B.C	96
961	Chalcopyrite and pyrite	Quartz Creek, Golden, B.C	95
962	Pyrite in quartz	Porcupine Creek, Golden, B.C	24
963	Pyrite in quartz	Spillimachene, Golden, B.C	24
964	Galena	Timbasket Lake, Golden, B.C	77
965	Auriferous quartz	Quartz Creek, Golden, B.C	25
966	Galena and chalcopyrite	Ottertail Creek, Golden, B.C	85
967	Galena	McMurdo Creek, Golden, B.C	75
968	Tetrahedrite and galena	Spillimachene, Golden, B.C	77
969	Galena	McMurdo Creek, Golden, B.C	75
970	Pyrite	Spillimachene, Golden, B.C	24
971	Tetrahedrite and galena	Spillimachene, Golden, B.C	76
972	Galena	Spillimachene Mt., Golden B.C	77
973	Chalcopyrite	Spillimachene, Golden, B.C	95
974	Galena with carb. of copper	Jubilee Mt., Golden, B.C	85
975	Chalcocite	Jubilee Mt., Golden, B.C	96
976	Chalcocite	Jubilee Mt., Golden, B.C	96
977	Chalcopyrite	Spillimachene, Golden, B. C	95
978	Chalcopyrite	Kicking Horse R., Golden, B.C	85
979	Chalcopyrite	Golden, B.C	96
980	Pyrite in quartz	Spillimachene, Golden, B.C	24
981	Galena	Mt. Stephen, Golden, B.C	77
982	Galena	Spillimachene, Golden, B.C	77
983	Pyrite in quartz	Spillimachene, Golden, B.C	25

No.			Page
984	Galena	Boulder Creek, Windermere, B.C	79
985	Chalcopyrite and galena	Ottertail Creek, Golden, B.C	85
986	Galena and chalcopyrite	Ottertail Creek, Golden, B.C	85
987	Chalcopyrite	Fifteen-mile Creek, Golden, B.C	95
988	Galena, malachite and chalcocite	Golden, B.C	94
989	Tetrahedrite	Golden, B.C	94
990	Jamesonite and galena	Vermont Creek Golden, B.C	76
991	Galena and chalcopyrite	Ottertail Creek, Golden, B.C	85
992	Galena	Vermont Creek, Golden, B.C	76
993	Chalcopyrite	Canon Creek, Golden, B.C	59
994	Galena	Mt. Stephen, Golden, B.C	77
995	Chalcopyrite	McLean Creek, Golden, B.C	95
996	Chalcopyrite	Vermont Sleigh Rd., Golden, B.C	94
997	Chalcopyrite	Spillimachene, Golden, B.C	95
998	Galena	Spillimachene Mt., Golden, B.C	77
999	Peat	Welland County, Ont	152
1000	Petroleum	Gaspé, Que	158
1001	Hæmatite	Storrington, Ont	126
1002	Pressed bricks	Milton, Ont	217
1003	Mica	Wright, Que	170
1004	Marble	Nipigon Bay, Ont	204
1005	Volcanic breccia	Seymour, Ont	192
1006	Granite	St. Ignace Station, Ont	185
1007	Marble	Cornwall, Ont	206
1008	Marble	Elzevir Ont	206
1009	Marble	Thunder Bay, Ont	204
1010	Marble	Wolf Lake, Thunder Bay, Ont	204
1011	Granite	Pearl River Sta., Thunder Bay, Ont.	186
1012	Marble	Marmora, Ont	205
1013	Marble	Barrie Tp., Frontenac, Ont	205
1014	Marble	Renfrew, Ont	205
1015	Platinum	Similkameen River, Yale, B.C	107
1016	Sperrylite	Sudbury, Ont	108
1017	Auriferous pyritous ore	Skookumchuck Creek, Fort Steele, B.C	26
1018	Galena and pyrite	Fort Steele, B.C	80
1019	Galena	Fort Steele, B.C	80
1020	Galena and Blende	Fort Steele, B.C	81
1021	Galena	Fort Steele, B.C	80
1022	Galena	Fort Steele, B.C	80
1023	Limonite	East Kootenay, B.C	130
1024	Galena	Fort Steele, B.C	81
1025	Galena and chalcopyrite	Fort Steele, B.C	86
1026	Magnesian limestone	East Kootenay. B.C	209
1027	Chalcopyrite	Fort Steele, B.C	98
1028	Granite	St. Philippe, Grenville, Que	187
1029	Pyrrhotite and chalcopyrite, etc., and furnace products	Trail B.C	53
1030	Products of smelter	Nelson, B.C	82
1031	Molybdenite	Paint Hills, E. coast James Bay, N.E.T.	138
1032	Magnetite	Nastapoka Island, E. coast Hudson Bay, N.E.T	123

No.			Page.
1033	Titaniferous iron ore	Kenogami, Lake St. John, Que	132
1034	Amethyst	Thunder Bay, Ont	183
1035	Granite, fine and coarse	Rivière a Pierre, Que	188
1036	Amalgam	Cadwallader Creek, Lillooet. B.C	7
1037	Amalgam	Fraser River, Lillooet, B.C	7
1038	Gold dust	Fraser River, Lillooet, B.C	7
1039	Gold dust	Upper Bridge River, Lillooet, B.C	7
1040	Gold dust	Lower Bridge River, Lillooet, B.C	7
1041	Amalgam	Big Bar, Lillooet, B.C	7
1042	Amalgam	Hall Creek, Nelson, B.C	9
1043	Gold-bearing black sand	Wreck Bay, Vancouver Island, B.C.	3
1044	Amalgam	Quesnel River, Cariboo, B.C	4
1045	Gold dust	Fraser River, Cariboo, B.C	4
1046	Gold dust	Smoky River, Cariboo, B.C	5
1047	Gold dust	Cotttonwood River, Cariboo, B.C	5
1048	Gold dust	Shepherd Creek, Cariboo B.C	5
1049	Gold dust	Coffee Creek, Cariboo, B.C	5
1050	Gold dust	Slough Creek, Cariboo, B.C	5
1051	Gold dust	Lightning Creek, Cariboo, B.C	5
1052	Gold dust	Nelson Creek, Cariboo, B.C	5
1053	Gold	Burns Creek Mt., Cariboo, B.C	5
1054	Gold dust	Lower Williams Creek, Cariboo, B.C.	5
1055	Gold	Williams Creek, Cariboo, B.C	5
1056	Gold	Upper Williams Creek, Cariboo, B.C	5
1057	Amalgam	Lowhee Creek, Cariboo, B.C	5
1058	Gold dust	Cunningham Creek, Cariboo, B.C	6
1059	Gold dust	Grouse Creek, Cariboo, B.C	6
1060	Gold dust	Eight-mile Lake, Cariboo, B.C	6
1061	Nugget	Cariboo, B.C	6
1062	Nuggets	Stout Gulch, Cariboo, B.C	6
1063	Nuggets	Mosquito Creek, Cariboo, B.C	6
1064	Nuggets	Lowhee Creek, Cariboo, B.C	6
1065	Nuggets	Lightning Creek, Cariboo, B.C	6
1066	Gold dust	Summit Creek, Cariboo, B.C	6
1067	Gold	Quesnel Forks, Quesnel, B.C	6
1068	Platinum	Quesnel Forks, Quesnel, B.C	107
1069	Gold	Quesnel Forks, Quesnel, B.C	7
1070	Black sand	Quesnel Forks, Quesnel, B.C	7
1071	Gold dust	Horsefly River, Quesnel, B.C	7
1072	Gold dust	Keithly Creek, Quesnel, B.C	7
1073	Gold dust	Quesnel Forks, Quesnel, B.C	7
1074	Gold dust	Quartz Creek, Golden, B.C	9
1075	Gold dust	Thibet Creek, Cassiar, B.C	4
1076	Gold dust	McDame Creek, Cassiar, B.C	4
1077	Gold dust	Dease Creek, B.C	4
1078	Amalgam	Liard River, Cassiar, B.C	4
1079	Gold dust	Poorman Gulch, Cassiar, B.C	4
1080	Gold dust	Messetoe Creek, Cassiar, B.C	4
1081	Gold dust	Rosella Creek, Cassiar, B.C	4
1082	Gold dust	Snow Creek, Cassiar, B.C	4

No.			Page.
1083	Gold dust	Quartz Creek, Cassiar, B.C	4
1084	Gold dust	Walker Creek, Cassiar, B.C	4
1085	Gold dust	McKee Creek, Atlin, B.C.	3
1086	Gold dust	Spruce Creek, Atlin, B.C.	3
1087	Gold dust	Pine Creek, Atlin, B.C	3
1088	Gold dust	Birch Creek, Atlin, B.C	3
1089	Gold dust	Willow Creek, Atlin, B.C	3
1090	Gold dust	Wright Creek, Atlin, B.C	3
1091	Nuggets	Pine Creek, Atlin, B.C.	3
1092	Nuggets	Wright Creek, Atlin, B.C.	3
1093	Nuggets	Boulder Creek, Atlin, B.C.	3
1094	Gold dust	Fraser River, Yale, B.C	7
1095	Gold dust	Texas Creek Mouth, Yale, B.C	7
1096	Black sand	Norman Bar, Yale, B.C	8
1097	Gold dust	Rock Creek, Kettle River, B.C.	8
1098	Gold dust	Wild Horse Creek, Fort Steele, B.C.	9
1099	Gold dust	Fire Valley Creek, Arrow Lake, B.C.	8
1100	Gold dust	Fraser River, Yale, B.C	8
1101	Platinum	Fraser River, Yale, B.C	107
1102	Gold dust	Big Bend, Revelstoke, B.C	8
1103	Gold dust	Smith Creek, Revelstoke, B.C	8
1104	Gold dust	Columbia River, Revelstoke, B.C	8
1105	Nugget	French Creek, Revelstoke, B. C.	8
1105a	Gold dust	French Creek, Revelstoke, B.C.	8
1106	Gold dust	Victoria Gulch, Yukon, N.W.T.	10
1107	Gold dust	Quartz Creek, Yukon, N.W.T.	10
1108	Gold dust	Bonanza Creek, Yukon, N.W.T.	10
1109	Gold dust	Dominion Creek, Yukon, N.W.T.	11
1110	Gold dust	Gold Run Creek, Yukon, N.W.T.	12
1111	Gold dust	Sulphur Creek, Yukon, N.W.T.	11
1112	Gold dust	Last Chance Creek, Yukon, N.W.T.	12
1113	Gold dust	Dominion Creek, Yukon, N.W.T.	11
1114	Gold dust	Eldorado Creek, Yukon, N.W.T.	11
1115	Gold dust	Hunker Creek, Yukon, N.W.T.	12
1116	Gold dust	Hunker Creek, Yukon, N.W.T.	12
1117	Gold dust	Livingston Creek, Salmon River, Yukon, N.W.T	12
1118	Gold dust	Bonanza Creek, Yukon, N.W.T.	10
1119	Nuggets	Eldorado Creek, Yukon, N.W.T.	11
1120	Nuggets	Bonanza Creek, Yukon, N.W.T.	10
1121	Nuggets	Forty-mile Creek, Yukon, N.W.T.	12
1122	Gold dust	Eldorado Creek, Yukon, N.W.T.	11
1123	Gold dust	Eldorado Creek, Yukon, N.W.T.	11
1124	Gold dust	Eureka Creek, Yukon, N.W.T.	12
1125	Model of nugget	Mosquito Creek, Cariboo, B.C	2
1126	Model of nugget	Keithley Creek, Cariboo, B.C.	2
1127	Arquerite (model of)	Cariboo, B.C.	61
1128	Arquerite (model of)	Cariboo, B.C.	61
1129	Model of nugget	Cassiar, B.C.	2
1130	Model of nugget	Mosquito Creek, B.C.	2

No. PAGE.
1131 Model of nuggets.............Tributaries of the Chaudiere, Beauce, Que.............................. 14
1132 Gold dust.....................Omineca, B.C..................... 2
1133 Gold dust.....................N.E. of Rivière des Plantes, Beauce, Que............................... 14
1134 Gold dust.....................Gilbert River, Beauce, Que......... 14
1135 Gold dust.....................De Lery Concession, Beauce, Que... 14
1136 Gold dust.....................Ditton, Que........................ 14
1137 Small nuggets of arquerite....Cariboo, B.C....................... 61
1138 Gold dust.....................Saskatchewan River, N.W.T......... 13
1139 Gold dust.....................Saskatchewan River, N.W.T......... 13
1140 Model of nugget...............Gilbert River. Beauce, Que......... 14
1141 Model of nugget...............Forty-mile Creek, Yukon, N.W.T... 12
1142 Model of nugget...............Eldorado Creek, Yukon, N.W.T.... 11
1143 Model of nugget...............Eldorado Creek, Yukon, N.W.T.... 11
1144 Model of nugget...............Bonanza Creek, Yukon, N.W.T..... 10
1145 Galena........................Fitzroy, Ont...................... 105
1146 Graphite......................Waltham, Pontiac, Que............. 172
1147 Lithographic stone............Temiscaming, Ont.................. 184
1148 Gold (dredging)...............Fraser River, Yale, B.C............ 8
1149 Nugget........................Stevens Creek, Cariboo, B.C........ 6
1150 Gold dust.....................Manson Creek, Omineca, B.C....... 4
1151 Coal..........................Comox, B.C........................ 141
1152 Coll. of stones and agate ornaments.............................. 182
1153 Gold..........................Bonanza Creek, Yukon, N.W.T..... 11
1154 Gold..........................Bonanza Creek, Yukon, N.W.T...... 11
1155 Bornite (auriferous)..........Near White Horse Rapids, Yukon, N.W.T.......................... 87
1156 Gold dust.....................Bonanza Creek, Yukon, N.W.T..... 11
1156a Gold.........................Bonanza Creek, Yukon, N.W.T..... 10
1157 Gold..........................Bonanza Creek, Yukon, N.W.T..... 10
1158 Gypsum........................Newport Station, N.S.............. 215
1159 Marble........................Escasoni, N.S..................... 208
1160 Rock drill....................Belleville, Ont.................... ..
1161 Mica boiler covering..........Toronto, Ont...................... 171
1162 Coal..........................Cape Breton, N.S.............. 146 & 147
1163 Sect. model of gold district of Goldenville....................Guysborough, N.S................. 45
1164 Galena........................Slocan, B.C....................... 70
1165 Galena........................Vermont Creek, Golden B.C........ 76
1166 Auriferous pyrite.............Quesnel, Cariboo, B.C............. 17
1167 Malachite.....................Jubilee Mt., Golden B.C........... 96
1168 Auriferous pyrite.............Island Mt., Cariboo, B.C.......... 17
1169 Malachite.....................Spillimachene, Golden B.C......... 95
1170 Auriferous pyrite.............Cariboo, B.C...................... 17
1171 Galena........................Illecillewaet, B.C................ 64
1172 Galena........................Ainsworth, B.C.................... 74
1173 Galena........................Slocan, B.C....................... 70
1174 Galena........................Fort Steele, B.C.................. 80
1175 Galena........................Slocan, B.C....................... 70

No.			Page.
1176	Galena	Slocan. B.C	70
1177	Auriferous quartz	Fairview, Osoyoos, B.C.	18
1178	Auriferous quartz	Fairview, Osoyoos, B.C.	18
1179	Auriferous quartz	McMurdo Creek, Golden, B.C	24
1180	Galena	Fish Creek, Lardeau, B.C	64
1181	Magnetite	Kamloops, B.C	118
1182	Magnetite	Texada Island, B.C	118
1183	Asbestus (chrysotile)	Thetford, Que	168
1184	Shale and brick	Clinton, Ont	217
1185	Fire-clay	Comox, B.C	173
1186	Gold	Bonanza Creek, Yukon, N.W.T	10
1187	Gold	Bonanza Creek, Yukon, N.W.T	10
1188	Gold	Eldorado Creek, Yukon, N.W.T	12
1189	Gold	Hunker Creek, Yukon, N.W.T	12
1190	Pyrite	Blithfield Tp., Renfrew, Ont	159
1191	Gold	Otter Creek, Atlin, B.C	3

I.

METALS AND THEIR ORES.

GOLD.

The gold production of Canada in 1899 constituted over 44 per cent. of the total mineral production of the country, the preliminary summary statement of the mineral production by the Geological Survey valuing this item at over $21,000,000. These figures, though still subject to revision, are sufficiently accurate for the illustration of main facts respecting the gold output. Of the amount stated, the relative proportion contributed by the Yukon District and several provinces is approximately as follows :

Yukon District	about	75.55	per cent.
British Columbia	"	19.83	"
Nova Scotia	"	2.53	"
Ontario	"	1.98	"
Saskatchewan River	"	0.08	"
Quebec	"	0.03	"
		100.00	

Of the total production for Canada about 18 per cent. of the gold results from vein mining, the whole production of Ontario and Nova Scotia coming under this head with about one-third of that of British Columbia. All the rest is obtained from the exploitation of alluvial deposits.

The characteristics of various deposits from which the metal is produced are described below in connection with the different groups of exhibits.

Alluvial Gold.

Apart from the relatively small areas of gold-bearing gravels in Quebec, the alluvial gold deposits are practically confined to the western portion of Canada, along the valleys of the rivers and streams of the mountainous areas comprised within the Province of British Columbia and the

Yukon District. A number of the rivers heading in these mountain ranges, but taking their courses eastward through the prairie country of the Northwest Territories, also carry gold, and in the case of the Saskatchewan a certain amount is extracted yearly.

BRITISH COLUMBIA.

In British Columbia it may be said that almost every stream or river has yielded more or less of the precious metal, and the placer-mining industry was until the last few years practically the only source of the gold produced in this province. By 1863, a few years after the first discovery of these gold-bearing gravels, the production of the province had risen to nearly $4,000,000. A gradual but steady falling off of the output followed, as the shallower and richer deposits became worked out, until in 1893 it reached its lowest at a little over $500,000. Since that date, however, there has been a renewed increase, and the production of placer gold for 1899 reached nearly $1,350,000. This result has been partly due to the discovery of new shallow placers and partly to extension of the hydraulic methods of work by companies whose large capital enable them to provide the expensive plant and water supply necessary for obtaining gold contained in the poorer and less accessible gravels.

Considerable attention is being devoted to river dredging as a method of winning the precious metal from the sands and the gravels of the rivers. Should the work now being prosecuted in British Columbia demonstrate that the gravels of the rivers can be profitably worked, very extensive operations may be expected. Several more or less successful attempts have been made, the majority on the Fraser River, where several types of dredges have been tried, including suction, dipper and elevator dredges, the last-named type having given the best results. The main difficulty encountered is in the saving of the fine or flour gold.

Keithley Creek, Cariboo, B.C. .... *Geological Survey*

1126. Model of gold nugget.

Mosquito Creek, Cariboo, B.C. .... *Geological Survey*

1125. Model of gold nugget.

1130. " " "

Cassiar, B.C. .... *Geological Survey*

1129. Model of gold nugget.

Omineca, B.C. .... *Geological Survey*

1132. Gold dust.

The specimens of gold nuggets and gold dust comprised in the following list have been collected and are exhibited by the Department of Mines of British Columbia :

Wreck Bay, Ucluclet, West Coast Vancouver Island Mining Div., B.C. ....*J. E. Sutton.*

1043. Gold-bearing black sand.

McKee Creek, Atlin Mining Division, B.C.

1085. Gold dust, 2 oz., worth $16.25 per oz.

Spruce Creek, Atlin Mining Division, B.C.

1086. Gold dust, 2 oz., worth $16.25 per oz.

Pine Creek, Atlin Mining Division, B.C.

1087. Gold dust, 2 oz., worth $16.25 per oz.

Birch Creek, Atlin Mining Division, B.C.

1088. Gold dust, 2 oz., worth $16.25 per oz.

Willow Creek, Atlin Mining Division, B.C.

1089. Gold dust, 2 oz., worth $16.25 per oz.

Wright Creek, Atlin Mining Division, B.C.

1090. Gold dust, 2 oz., worth $16.25 per oz.

Pine Creek, Atlin Mining Division, B.C.

1091. Nuggets, 31 oz. 1 dwt., worth $18 per oz.

Wright Creek, Atlin Mining Division, B.C.

1092. Nuggets, 25 oz ½ dwt., worth $18 per oz.

Boulder Creek, Atlin Mining Division, B.C.

1093. Nuggets, 19 oz. 3 dwt., worth $18 per oz.

The above nine exhibits from Atlin are from sluice workings.

Otter Creek, Atlin Mining Division, B.C.

1191. Nugget, 19 oz., 73 per cent. gold and 27 per cent. quartz ; also smaller nugget.

Manson Creek, Omineca Mining Division, Cariboo, B.C. — *43rd Mining & Milling Co. of Cariboo, Ottawa, Ont.*

1150. Gold dust, 2.35 oz., worth $16.50 per oz.

Thibert Creek, Cassiar, Liard Mining Division, B.C.

1075. Gold dust, 1 oz., worth $16 per oz.

McDame Creek, Cassiar, Liard Mining Division, B.C.

1076. Gold dust, 1½ oz. worth $18 per oz.

Dease Creek, Cassiar, Liard Mining Division, B.C.

1077. Gold dust, 1 oz., worth $15 per oz.

Liard River, Cassiar, Liard Mining Division, B.C.

1078. Amalgam, 0.5625 oz., value $9.

Poorman Gulch, Cassiar, Liard Mining Division, B.C.

1079. Gold dust, ½ oz., worth $18 per oz.

Messetoe Creek, Cassiar, Liard Mining Division, B.C.

1080. Gold dust, ½ oz., worth $18 per oz.

Rosella Creek, Cassiar, Liard Mining Division, B.C.

1081. Gold dust, ½ oz., worth $18 per oz.

Snow Creek, Cassiar, Liard Mining Division, B.C.

1082. Gold dust, ½ oz., worth $18 per oz.

Quartz Creek, Cassiar, Liard Mining Division, B.C.

1083. Gold dust, ½ oz., worth $18 per oz.

Walker Creek, Cassiar, Liard Mining Division, B.C.

1084. Gold dust, ½ oz., worth $19 per oz.

Quesnel River, Cariboo, B.C. .... *Northwest Dredging Co.*

1044. Amalgam, 1.34 oz., worth $17 per oz.
Dredger workings.

Fraser River, Cariboo B.C.

1045. Gold dust, 1.25 oz., worth $16 per oz.

Smoky River, Cariboo, B.C.

1046. Gold dust, 1.21 oz., worth $16.50 per oz.

Cottonwood River, Cariboo, B.C.

1047. Gold dust, 0.31 oz., worth $17 per oz.

Shepherd Creek, Cariboo, B.C. .... *Odlum & Shepherd.*

1048. Gold dust, 1 oz., worth $17 per oz.
From hydraulic workings.

Coffee Creek, Cariboo, B.C. .... *Moss & St. Clair.*

1049. Gold dust, 2 oz., worth $17.25 per oz.

Slough Creek, Cariboo, B.C.

1050. Gold dust, 2 oz., worth $17.25 per oz.

Lightning Creek, Cariboo, B.C.

1051. Gold dust, 1 oz., worth $17.25 per oz.

Nelson Creek, Cariboo, B.C.

1052. Gold dust, 2 oz., worth $17.25 per oz.

Burns Creek Mountain, Cariboo, B.C.

1053. Gold, ½ oz., worth $16.50 per oz.

Lower Williams Creek, Cariboo, B.C. .... *Cariboo Gold Field Co.*

1054. Gold dust, 2 oz., worth $16 per oz.
Worked by hydraulic elevator.

Black Jack Claim, Williams Creek, Cariboo, B.C.

1055. Gold dust, 1½ oz., worth $15.87 per oz.
Nuggets, 0.48 oz., worth $15.75 per oz.

San Juan Claim, Upper Williams Creek, Cariboo, B.C.

1056. Gold dust, 2 oz., worth $15.50 per oz.

Lowhee Creek, Cariboo, B.C. .... *Victoria Consolidated.*

1057. Amalgam, 2 oz., worth $17.25 per oz.
Hydraulic workings.

Cunningham Creek, Cariboo, B.C.

1058. Gold dust, 1½ oz., worth $16.50 per oz.

Grouse Creek, Cariboo, B.C.

1059. Gold dust, 0.51 oz., worth $16 per oz.

Eight-mile Lake, Cariboo, B.C.

1060. Gold dust, 1½ oz., worth $17 per oz.

Cariboo, B.C.

1061. Nugget, 4.01 oz., worth $16 per oz.

Stout Gulch, Cariboo, B.C.

1062. Nuggets, 0.94 oz., worth $17.25 per oz.
Sluice workings.

Mosquito Creek, Cariboo, B.C.

1063. Nuggets, 0.82 oz., worth $17.25 per oz.
Sluice workings.

Lowhee Creek, Cariboo, B.C.

1064. Nuggets, 1.61 oz., worth $17.25 per oz.

Lightning Creek, Cariboo, B.C.

1065. Nuggets, 1.0625 oz., worth $17.50 per oz.
Sluice workings.

Summit Creek, Cariboo, B.C............. *Colonial Mines and Development Co.*

1066. Gold dust, 2 oz., worth $18.33 per oz.
Hydraulic workings.

Stevens Creek, Cariboo, B.C.. *F. E. Younge.*

1149. Nugget, 17 oz., worth $18.50 per oz.
Hydraulic workings.

Quesnel Forks, Quesnel Mining Division, Cariboo, B.C. } *Consolidated Cariboo Hydraulic Mining Co.*

1067. Nugget, 440 grains, value $15.40.

1067*a*. Nuggets, 2 oz., worth $16.30 per oz.

1067*b*. Amalgam, 2 oz., worth $9.00 per oz.

1067*c*. Amalgam, 2 oz., worth $16.30 per oz.

Horsefly Hydraulic Mine, Quesnel Mining Division, Cariboo, B.C. ......*Horsefly Hydraulic Mining Co.*

1069. Gold, 700 grains, value $24.50.
Stamp mill, from cemented gravels.

1070. Black sand, 1 lb.
From hydraulic tailings.

Horsefly River, Quesnel Mining Division, Cariboo, B.C.

1071. Gold dust, 2 oz., worth $16.90 per oz.

Keithly Creek, Quesnel Mining Division, Cariboo, B.C.

1072. Gold dust, 2 oz., worth $17.40 per oz.

Quesnel Forks, Quesnel Mining Division, Cariboo, B.C.

1073. Gold dust, 2 oz., worth $16.50 per oz.

Cadwallader Creek, Lillooet, B.C. ....*J. R. Williams & Co.*

1036. Amalgam, value $15.50.

Fraser River, Lillooet, B.C.

1037. Amalgam, value $15.50.

Fraser River, Lillooet, B.C.

1038. Gold dust, value $16.50.

Upper Bridge River, Lillooet, B.C....................................*D. Hamilton.*

1039. Gold dust, value $17.

Lower Bridge River, Lillooet, B.C..*C. Lush.*

1040. Gold dust, value $17.

Big Bar, Lillooet, B.C.

1041. Amalgam, value $16.

Dredging Lease No. 1, Fraser River, Yale District, B.C. .... *W. H. Gallagher.*

1094. Gold dust, 2 oz., worth $17.89 per oz.

Dredging Lease No. 2, Texas Creek Mouth, Yale District, B.C. .... *W. H. Gallagher.*

1095. Gold dust, 2 oz., worth $17.89 per oz.

Dredging Lease No. 3, Norman Bar, Yale District, B.C. .... *W. H. Gallagher.*

1096. Black sand.

Lytton, Fraser River, Yale District, B.C. .... *J. Cobeldick.*

1148, Coarse gold, 8 oz., worth $19 per oz.

1148*a*. Medium gold, 2.2 oz., worth $19 per oz.

1148*b*. Fine gold, 1 oz., worth $19 per oz.

North Bend, Fraser River, Yale District, B.C. *Beatty Gold Dredging & Mining Co.*

1100. Gold dust, 2.08 oz., worth $17.27 per oz.

Rock Creek, Kettle River Mining Division, Yale District, B.C.

1097. Gold dust, 1 oz., worth $16.50 per oz.
Sluice workings.

Ophir, Big Bend, Revelstoke Mining Division, West Kootenay, B.C. .... *Ophir Bed Rock Flume Co.*

1102. Gold dust, 2 oz. 5 dwt. 14 gr., worth $18 per oz.

1102*a*. Gold dust, 1.95 oz., worth $18 per oz.

Carlysle Claim, Smith Creek, Revelstoke Mining Division, West Kootenay, B.C.

1103. Gold dust, 2 oz., worth $18 per oz.

Columbia River, Revelstoke Mining Division, West Kootenay, B.C.

1104. Gold dust, 2 oz., worth $18 per oz.

Consolation, French Creek, Revelstoke Mining Division, West Kootenay, B.C. .... *Geo. La Forme & Co.*

1105. Nugget, 2.27 oz., worth $47.

1105*a*. Gold dust, 1 oz. 3 dwt. 3 gr., worth $20.80.

Fire Valley Creek, Arrow Lake Mining Division, West Kootenay, B.C.

1099. Gold dust, 0.9 oz., worth $16 per oz.

Hall Creek, Nelson Mining Division, West Kootenay, B.C.

1042. Amalgam, value $35.

Quartz Creek, Golden Mining Division, East Kootenay, B.C. ....*J. C. Pitts.*

1074. Gold dust, 3 oz. 7 dwt. 16 gr., worth $18 per oz.

Choo Chee Woo Claim, Wild Horse Creek, Fort Steele Mining Division, East Kootenay, B.C.

1098. Gold dust, 1 oz., worth $18 per oz.
Sluice workings.

Yukon District.

Placer gold mining has been carried on in the Yukon District since 1881. The industry began with river-bar mining on the Lewes, Salmon, Stewart and other rivers. In 1886 coarse gold was discovered on Fortymile River, and, subsequently, a number of the tributaries of this river, and also of Sixty-mile River, a neighbouring stream, were found to be auriferous. In 1896 the Klondike discovery was announced, and the centre of the industry was moved there. This new and very rich field has an area of about 800 square miles. The principal auriferous streams are Bonanza, with its tributary Eldorado Creek, Bear Creek and Hunker Creek flowing into the Klondike ; and Quartz Creek and Dominion Creek, with its two tributaries Gold Run and Sulphur creeks, flowing into Indian River. The total length of the paying portions (at present) of the productive creeks aggregates about fifty miles. The richest parts of the valleys yield at the rate of about $2,000 per running foot, with a pay-streak 150 to 300 feet in width. The creek-gravels have a thickness, as a rule, of from six to ten feet, and are overlain by a bed of black "muck" usually from ten to fifteen feet in thickness. The lower three or four feet of the gravels, with about two feet of the underlying broken and decomposed bed-rock, hold the greater part of the gold. Besides the stream-gravels, auriferous gravel terraces occur on the sides of most of the valleys, and Bonanza, Eldorado, Hunker and Quartz creeks are also bordered in places by wide rock-cut flats at elevations ranging from 100 to 300 feet above the present valley-bottoms, on which heavy deposits of gravel have been accumulated. These gravels represent the wash of older valleys that followed approximately the direction of the present ones, and have a thickness in places of over 100 feet. They are everywhere more or less gold-bearing, and in places, especially towards the base of the formation, are extremely rich. Klondike gold occurs, as a rule, in coarse grains, usually showing some degree of angularity, and is often quite rough and unworn. Small nuggets are plentiful in places, and larger ones up to about $1,000 in value are occasionally found.

The grade of the gold varies on the different creeks from about $14.50 to $17.50 per ounce. The production of the district for the last three years is approximately as follows:

1897	$ 2,500,000
1898	10,000,000
1899	16,000,000
	$28,500,000

Victoria Gulch, Klondike, Yukon District.

1106. Gold dust, 1¼ oz., worth $16 per oz.

Quartz Creek, Klondike, Yukon District.

1107. Gold dust, 1.17 oz., worth $17.25 per oz.

Bonanza Creek, Klondike, Yukon District.

1108. Gold dust, 1 oz., worth $16 per oz.

1144. Model of gold nugget.

1118. Gold dust, 1 oz., worth $16 per oz.

Bonanza Creek, Claim No. 19, above Discovery, Klondike, Yukon District. } *R. R. Lowe, Dawson City, Yukon District.*

1186. Gold, 1 oz.

Bonanza Creek, Claim No. 36, above Discovery, Klondike, Yukon District. } *W. Ogilvie, Dawson City, Yukon District.*

1120. Three nuggets, 16.7 grains.

Bonanza Creek, Claim No. 2*a*, above Discovery, Klondike, Yukon District. } *R. R. Lowe, Dawson City, Yukon District.*

1187. Gold, 2 oz.

Bonanza Creek, Claim No. 2, above Discovery, Klondike, Yukon District. } *McDonald's Bonanza Klondike Ltd., Old Broad street, London, Eng.*

1157. Gold, weight 61.39 oz., recovered from one pan of gravel weighing 20 lbs.

1156*a*. Gold, weight 80.43 oz.

Skookum Gulch, Bonanza Creek, Klondike, Yukon District. — *McDonald's Bonanza Klondike Ltd., Old Broad street, London, Eng.*

1156. Gold dust, value £61 19s. (20.65 oz.), one-tenth part of the amount recovered by four men sluicing for 17 hours.

Bonanza Creek, Klondike, Yukon District. — *Collected by R. G. McConnell, Geological Survey.*

1153. Section of gravels reconstructed from samples taken at Claim No. 27, above Discovery, belonging to the North American Transportation Co., Dawson.

At this point the succession of beds encountered in mining was as follows :—About one foot of surface "muck," then nine feet of alternating beds of "muck," sand and gravel carrying no payable gold. At ten feet from the surface the "pay-dirt" is encountered, measuring some four feet in thickness, all of which, together with the upper two feet, or broken portion of the underlying bed-rock, is worked for gold.

Bonanza Creek, United Mines, Adams Hill, Klondike, Yukon District. ....*Geological Survey.*

1154. Section of gravel, showing pay-dirt.

Dominion Creek, Klondike, Yukon District.

1109. Gold dust, 1 oz., worth $16 per oz.

1113. Gold dust, 1 oz., worth $15 per oz.

Sulphur Creek, Klondike, Yukon District.

1111. Gold dust, 1 oz., worth $16 per oz.

Eldorado Creek, Klondike, Yukon District.

1114. Gold dust, 1½ oz., worth $16 per oz.

1119. Three nuggets, 19.2 grammes.

W. Ogilvie, Dawson City, Yukon District.

1122. Gold dust in one cubic foot of gravel, estimated at 5¾ oz. 1.2 dwt., value $93.

W. Leek, Dawson City, Yukon District.

1123. Gold dust washed from one cubic foot of gravel, value $93.

W. Leek, Dawson City, Yukon District.

1142. Model of gold nugget, 60.65 grammes.

1143. " " " 77.9 "

Eldorado Creek, Klondike, Yukon District. — *R. R. Lowe, Dawson City, Yukon District.*

1188. Gold, 2 oz.

Hunker Creek, Claim No. 35, above Discovery, Klondike, Yukon Dist. — *R. R. Lowe, Dawson City, Yukon District.*

1189. Gold, 2 oz.

Hunker Creek, Klondike, Yukon District.

1115. Gold dust, 1¼ oz., worth $16 per oz.

1116. Gold dust, 1½ oz., worth $17 per oz.

Eureka Creek, Klondike, Yukon District.

1124. Gold dust, 1 oz., worth $15 per oz.

Gold Run Creek, Klondike, Yukon District.

1110. Gold dust, 1¼ oz., worth $16 per oz.

Last Chance Creek, Klondike, Yukon District.

1112. Gold dust, 1¼ oz., worth $16 per oz.

Livingston Creek, Big Salmon River, Yukon District.

1117. Gold dust.
Two nuggets, 1.1 oz.

Forty-mile Creek, Yukon District... — *W. Ogilvie, Dawson City, Yukon District.*

1121. Three nuggets, 2.35 grammes.

1141. Model of gold nugget, 13½ oz.

Alberta and Athabasca Districts.

Although figures of production are available only as far back as 1887, mining for gold in the above-mentioned districts of the Northwest Territories has been prosecuted to a greater or less extent for the past thirty years or more. The precious metal has been found upon the South Saskatchewan River, the Peace River and the McLeod, Athabasca, Bow, Old Man and other rivers, but the North Saskatchewan, for about sixty miles above and a similar distance below Edmonton, has been the chief field of operations, and has attracted the largest number of miners. The early miners are said to have made from $20 to $30 a day, but from $1 to $1.50 is now considered a fairly good daily average.

The bulk of the output, even during the past three years, has been taken out by the "hand miners" working with pick and shovel, and employing the rocker or grizzly. Steam dredges have, however, been introduced, and as the result of improvements depending upon experience here and elsewhere in recent years, it seems likely that these will play an important part in future mining.

No gold has been found in the Saskatchewan River above Rocky Mountain House, though frequently looked for by experienced miners. Its origin, therefore, cannot be the Rocky Mountains, but is in all probability the glacial drift, which is spread over the country for hundreds of miles; and which is largely derived from the great belt of crystalline Archæan rocks to the north-east. These rocks are largely developed about Lake Superior and Lake Huron, and extend from the former lake in a north-westerly direction to the Arctic Ocean. The gold is always in a very finely divided state, showing that it has been transported from a great distance.

North Saskatchewan, N.W.T .... *Geological Survey.*

1138. Gold dust, collected by amalgamation.

Edmonton, Saskatchewan River, N.W.T. .... *Geological Survey.*

1139. Gold dust.

QUEBEC.

Gold is reported to have been first discovered in the valley of the Chaudière about the year 1823 or 1824, near the mouth of the Touffe des Pins or Gilbert River, an affluent of the Chaudière. In 1835 the occurrence of gold in this region was mentioned by Lieutenant Baddeley, R.E. Since that date repeated examinations have shown it to be distributed over much of the country lying between the Chaudière River and the boundaries of Maine and New Hampshire, and embracing the south-eastern townships of the Province of Quebec. Although more or less gold may be found in nearly every stream in this area, its profitable extraction has as yet been confined to two localities, *viz.*: the upper waters of the Salmon River, in the county of Compton, and along the Chaudière and its tributaries in the county of Beauce.

The Beauce auriferous region embraces the valleys of the Chaudière and du Loup, and their tributaries, stretching from St. Joseph, in the Province of Quebec, to the United States boundary line; but the scene of the most important workings for the precious metal has been the Gilbert River, whence the greater part of the gold recorded as having come from Beauce has been extracted. Some very large nuggets have been found, the heaviest weighing 71 ounces, others 52 and 51 ounces, and a large number respectively worth several hundred dollars.

There are two kinds of auriferous gravels represented, the post-glacial, feebly auriferous as a rule, and the pre-glacial, usually oxidized and containing much gold, especially in the bottom. These are found throughout in the river-beds of the auriferous area.

The alluvial gold worked in the other area is on a branch of the Ditton River. The principal workings are situated on Lots 39 and 40, Range IX of Ditton township.

Gold mining in these regions has consisted largely in the exploration and the washing of the gravels in the shallower beds, and but little has been attempted in the deeper portions, or where the auriferous deposits lie below the level of the present river-beds, except in the Gilbert valley, where alluvial mining was carried on at different depths from 30 to 80 feet below the channel of the present river.

Claim No. 3, near the forks of Gilbert River, Que.......... *Geological Survey.*

1140. Model of gold nugget, 3 lbs., 9 oz., 12 dwts.; $821.56.

This nugget was found 21st Jan., 1867, by Arch. McDonald, R. McDonald, J. McLeod and J. McRae.

Chaussegros Concession, Gilbert River. Lot 16, Seigniory of Vaudreuil, Beauce Co., Que. .... *Geological Survey.*

1134. Gold dust.

Ditton, Range VIII., Lot 14, Que................................. *Geological Survey.*

1136. Gold dust.

De Lery Concession, Lots 17 and 18. Seigniory of Vaudreuil, Beauce Co., Que. .... *Geological Survey.*

1135. Gold dust.

1135*a*. Gold dust.

First range north-east of Rivière des Plantes, Beauce Co., Que. .... *Geological Survey.*

1133. Gold dust.

Tributaries of the Chaudière, Beauce Co., Que. .... *Geological Survey.*

1131. Four models of gold nuggets.

Gold-bearing Quartz and Other Auriferous Ores.

The sources of the placer gold found in alluvial deposits are in the gold-bearing quartz veins and in other auriferous ores. These are to be sought for wherever placer gold occurs in any considerable amount, and the two classes of gold deposits are generally closely associated, although in Nova Scotia alluvial gold deposits are scarcely known, notwithstanding the richness of the veins of gold-bearing quartz, and in Quebec payable quartz veins have not yet been discovered in the district producing alluvial gold.

The gold produced from auriferous ores in Canada amounted in 1899 to about $3,820,000 or approximately 18 per cent. of the whole production of gold. Of the above amount, nearly 75 per cent. was produced in British Columbia, Nova Scotia contributing some 14 per cent. and Ontario about 11 per cent.

The auriferous ores of Canada may be arranged, for purposes of enumeration and description, under certain groups. The milling ores are those in which the metal occurs clearly in the native state or so associated with other minerals that it may be extracted by milling processes with or without the aid of amalgamation, chlorination or the cyanide process. Of this class are nearly all the ores of Nova Scotia and Ontario together with many of those of British Columbia. But even in such ores there is often a certain amount of pyritous concentrates, which, if saved, may be smelted. In contrast with these is a group of ores from which the metals must be extracted primarily by smelting, either at the mine or at outside smelters. To this class belong the auriferous sulphides of Rossland, B.C., with some others. No definite line can be drawn between these two classes. They mutually overlap, to some extent, but it is convenient and natural to make a general separation on the above lines and with the above reservations. It must, however, further be remembered in connection with this catalogue, that the information respecting the ores exhibited is often far from complete. Many of the specimens represent undeveloped deposits, of which the precise character in regard to treatment has not been ascertained ; again among the smelting ores some are not rich enough to go direct to the furnace, requiring in the first place concentration by milling.

The gold ores of the eastern provinces, being all comprised, as stated, within the milling class, the smelting ores are so far confined to certain districts in British Columbia.

It has been found necessary, however, for British Columbia, to institute a third class, in which gold, silver and copper are all present in quantities of some importance. These ores are often very varied in composition, and where the deposits have not been actually worked as yet, it is often impossible to say which metal is the ruling one in regard to values. Such ores are therefore classed, where nothing to the contrary is actually known, as gold ores with silver and copper values. It is obvious that as development proceeds, many of them may prove to be essentially silver or copper ores with gold values.

In British Columbia the chief production and treatment of milling

gold ores is in the Nelson Division of West Kootenay and in camps McKinney and Fairview of the Yale district. In these places mills have been built to treat the ore from some twenty mines. Other mills have been built at various points throughout the province, as at Alberni, Phillips Arm, Cayoosh Creek and in East Kootenay.

The usual practice in treatment is to stamp the ore and amalgamate the gold which is free, and, at the same time, to concentrate the sulphide minerals for shipment to smelter. Treatment by cyaniding directly has been applied in two cases and is likely to become more usual in future.

Beyond the above well defined districts these milling gold ores often form a subsidiary class of metal-bearing deposits in several districts of British Columbia. They have to some extent been overlooked in the search for the more common smelting ores. They are associations of pyritous minerals and commonly blende and galena, disseminated in a quartz gangue, the gold being rarely visible. The-ore bodies are usually well defined veins, often two or three feet wide. In some much larger bodies the values are concentrated along curves or chutes. These veins appear to belong to no one locality or geological formation.

In the Nelson division, the gold ores as milled carry values of from $15 to $30 a ton. In Camp McKinney and Fairview they average about the same. In other isolated districts the ores appear to carry from $5 to $40 in gold, the lower value being at present unworkable.

The class of gold ores with silver and copper values are widely represented throughout British Columbia, but do not constitute a strongly marked group. They are commonly smelting ores, since each value can be recovered by such process, but so far the production is limited to a few mines. These ores appear to occur more frequently westwards of the Kootenay country in Kamloops and Kettle River districts, and along the coast, as on Vancouver Island and Texada Island. The combined values often make a workable ore where no single metal is in payable quantity.

The milling gold ores of eastern Canada will be found described under their several provinces.

Gold, Milling Ores.

Jingo Bird Claim, Sproat Lake, Alberni Mining Division, Alberni District, B.C. .... *W. Lindsay, Alberni, B.C.*

696. Auriferous pyrite.

Golden Eagle Claim, China Creek, Alberni Mining Division, Alberni District, B.C. .... *Mr. Newton, Victoria, B.C.*

693. Auriferous pyrite.

Rose Marie Claim, Kennedy Lake, W. Coast V. I., Alberni District, B.C. .... *B. Bonthrone, Clayoquot, B.C.*

702. Auriferous pyrite.

Doratha Morton Mine, Phillips Arm, Nanaimo District, B.C. *Fairfield Exploration Co, Vancouver, B.C.*

533. Quartz with pyrite.

This property is situated on the main coast of British Columbia, north of Seymour Narrows. The deposits appear to consist of a series of quartz ledges running in a general north-west and south-east direction, in places mineralized with iron sulphides carrying gold, with possibly some free gold in the quartz. The Doratha Morton mine is on the ledge on which most of the development work has been done. This mine is on one of a series of claims controlled by the Fairfield Exploration Co., and important development work has been confined to it. A mill for the treatment of the ore has been erected at Fanny Bay, $1\frac{1}{4}$ miles distant from the mine, with which it is connected by a Bleichert tramway, which has a transporting capacity of 10 tons per hour. The ore at the mill is fed to two Morrissons high-speed stamp-batteries, and then submitted to cyanide treatment.

Providence Claim, New Westminster Mining Division, Victoria District, B.C. *Providence Mining and Development Co.*

689. Auriferous and argentiferous quartz.

Island Mountain, Cariboo District, B.C. .... *Geological Survey.*

1168. Auriferous pyrite.

Cariboo District, B.C.................................... *B. C. Mining and Milling Co.*

1170. Auriferous pyrite.

Read Bros. Claim, Quesnel Mining Division, Cariboo District, B.C. .... *Geological Survey.*

1166. Auriferous pyrite.

Bend d'Or Claim, Bridge River, Lillooet Mining Division, B.C. *Bend d'Or Mines Co., Ltd., Vancouver, B.C.*

506. Auriferous quartz.

Gordon Claim, Harpers Creek, Kamloops Mining Div., Yale District B.C. .... *Gordon Mining Co.*

657. Quartz with decomposing pyrite.

Noonday Claim, Coal Hill, Kamloops Mining Division, Yale District, B.C. } *Noonday Mining Co., Kamloops, B.C.*

660. Auriferous quartz.

This is one of a group of six locations, situated about 4½ miles due south of Kamloops. Work of development has been concentrated on two of these; the Noonday has three exploratory shafts. The vein matter is stated to be a free milling gold quartz.

Wild West Claim, Fairview, Osoyoos Mining Division, Yale District, B.C. } .... *Geological Survey.*

1177. Auriferous quartz.

Brown Bear Claim, Fairview, Osoyoos Mining Division, Yale District, B.C. } .... *Geological Survey.*

1178. Auriferous quartz.

Old England Claim, Camp McKinney Osoyoos Mining Division, Yale District, B. C. } ....*H. Nicholson and E. James.*

609. Pyrite and pyrrhotite with traces of galena.

On this claim three tunnels 50 to 90 feet long and one inclined shaft have been driven as development work. The ore consists of pyrites, blende and galena in bluish quartz of high grade.

Minne-ha-ha Claim, Camp McKinney, Osoyoos Mining Division, Yale District, B.C. } *Minne-ha-ha Gold Mining and Milling Co., Toronto, Ont.*

610. Auriferous quartz.

The work on this claim consists of over 300 feet of shafting and drifting. The character of the ore is free milling and concentrating, the vein being white quartz carrying sulphides.

Victoria Claim, Camp McKinney, Osoyoos Mining Division, Yale District, B.C. } *Rock Creek Gold Mines, Ltd., Victoria, B.C.*

606. Auriferous quartz.

Fontenoy Claim, Camp McKinney, Osoyoos Mining Division, Yale District, B.C. } *Fontenoy Gold Mining and Milling Co., Camp McKinney, B.C.*

611. Galena and pyrite in quartz.

On this claim the showings, reached by shaft 80 feet deep, are said to consist of five feet of sulphide ore.

Sailor Claim, Camp McKinney, Osoyoos Mining Division, Yale District, B.C. — *Sailor Consolidated Gold Mining and Milling Co., Camp McKinney, B.C.*

612. Galena and pyrite in quartz.

On this claim a strong vein is said to have been exposed for 700 feet. Three exploratory shafts have been sunk and show high grade sulphides.

Gold Standard Claim, Camp McKinney, Osoyoos Mining Division, Yale District, B.C. — *Lemon Gold Mining and Milling Co., Omaha, U.S.*

608. Auriferous quartz.

Waterloo Claim, Camp McKinney, Osoyoos Mining Division, Yale District, B.C. .... *Waterloo Gold Mining Co.*

607. Auriferous quartz.

Cariboo-Amelia Claim, Camp McKinney, Osoyoos Mining Div., Yale District, B.C. — *Cariboo Consolidated Mining and Milling Co.*

613. Galena and pyrite in quartz.

This claim is one of the important ones of Camp McKinney and is worked actively. In 1898 it produced 11,000 ounces of bullion. The shaft is to reach a depth of 350 feet, and, so far, a considerabie quantity of drifting and other development work has been done. The ore is treated in a 20-stamp mill, which comprises also Wilfley and Johnson's concentrators, crushers, etc. The company owns several other claims, but all work is now concentrated on the Cariboo-Amelia vein.

Jewel Claim, Long Lake Camp, Kettle River Mining Division, Yale District, B.C. — *Jewel Mining Co., Greenwood, B.C.*

628. Tellurides of gold and silver in quartz.

Enterprise Claim, Long Lake Camp, Kettle River Mining Division, Yale District, B.C. — *Greenwood Gold Mining Co., Greenwood, B.C.*

627. Tellurides of gold and silver in quartz.

Lakeside Claim, Long Lake Camp, Kettle River Mining Division, Yale District. B.C. — *Cameron Emerson, Greenwood, B.C.*

626. Tellurides of gold and silver in quartz.

Earthquake Claim, Kettle River Mining Div., Yale District, B.C. } *Earthquake Consolidated Gold Mining Co., Greenwood, B.C.*

483. Pyrite in quartz.

Little Bertha Claim, Brown's Camp, Grand Forks Mining Division, Yale District, B.C. } *Hunter Kendrick Co., Grand Forks, B.C.*

470. Quartz with pyrite.

Laurier Claim, Brown's Camp. Grand Forks Mining Division, Yale District, B.C. } ....*R. Clark.*

469. Cupriferous quartz rock.

Roseberry Claim, Carnes Creek, Revelstoke Mining Div., West Kootenay, B.C. } *Carnes Creek Colonial Gold Mining Co. Revelstoke, B.C.*

744. Auriferous pyrite.

749. " "

This claim is on a mineralized belt of some fifty feet in width, containing gold values. Within this belt is a vein averaging five feet in width containing ore of higher values, the ore being auriferous arsenical sulphides. The development work consists of several hundred feet of tunnels and drifts.

C. O. D. Claim, Ground Hog Basin, Revelstoke Mining Div., West Kootenay, B.C. } *B. C. Alliance Syndicate, London, Eng.*

745. Auriferous quartz.

Maple Leaf Claim, Ground Hog Basin, Revelstoke Mining Div., West Kootenay, B.C. } *Mammoth Mining Co., Revelstoke, B.C.*

755. Auriferous quartz.

Ole Bull Claim, Ground Hog Basin, Revelstoke Mining Div., West Kootenay, B.C.. } *B. C. Alliance Syndicate, London, Eng.*

752. Auriferous quartz.

Orphan Boy Claim, Ground Hog Basin, Revelstoke Mining Div., West Kootenay, B.C. } ....*F. Davidson, Vancouver, B.C.*

751. Auriferous quartz.

Mulligan Claim, Keystone Mountain, Revelstoke Mining Division, West Kootenay, B.C. ... *Messrs. McNeill & Levesque, Revelstoke, B.C.*

746. Auriferous pyrite.

Annie Claim, McCulloch Creek, Revelstoke Mining Div., West Kootenay, B.C. ....*E. E. Erbsloh, London, Eng.*

753. Auriferous quartz.

Lade Group, Trout Lake Mining Div., West Kootenay, B.C. ....*Messrs. Lade Bros.* et al.

542. Altered siderite with pyrite and galena.

This group, which consists of several claims on the head-waters of the creek, is the first discovery of free milling ore in the division. So far the work has not been very actively pushed. It is reported that several veins here contain free gold visible to the naked eye, as well as tellurides.

Millie Mack Claim, Blue Grouse Mt., Arrow Lake Mining Division, West Kootenay, B.C. ... *Kamloops Mining and Development Co.*

541. Pyrite, arsenopyrite and galena in quartz.

Granite Claim, Nelson Mining Div., West Kootenay, B.C. .. *Duncan Mines, Ltd., Nelson, B.C.*

587. Pyrite.

426. Chalcopyrite and pyrite.

Athabasca Claim, Toad Mountain, Nelson Mining Division, West Kootenay, B.C. ....*E. N. Fell, Nelson, B.C.*

718. Auriferous ore.

Sylvia Claim, Toad Mountain, Nelson Mining Div., West Kootenay, B.C. ..*G. R. G. O'Driscoll, Nelson, B.C.*

430. Auriferous quartz.

Starlight Claim, Toad Mountain, Nelson Mining Div., West Kootenay. B.C.

434. Quartz and pyrite.

Venus Claim, Toad Mountain, Nelson Mining Div., West Kootenay, B.C. ....*Dr. Doolittle, Nelson, B.C.*

489. Ferruginous quartz.

Dandy Claim, Toad Mountain. Nelson Mining Div., West Kootenay. B.C. } ....*A. H. Kelly, Nelson, B.C.*

715. Galena and chalcopyrite.

Fern Claim, Hall Creek, Nelson Mining Div., West Kootenay, B.C. } *Fern Gold Mining Co., Nelson B.C.*

442. Chalcopyrite in quartz.

514. Chalcopyrite.

This is situated about ten miles from Nelson. The ore-body is worked by means of two tunnels. A ten-stamp mill has been erected by the company and is connected with the mine by a three-rail gravity tramway. The ore contains gold to the amount of about $9.25, of which over $7 is caught on amalgamating plates, the balance being in the concentrates.

Spodded Horse Claim, Ymir, Nelson Mining Division, West Kootenay B.C. } ....*Hank Wade, Ymir, B.C.*

407. Pyrrhotite.

Jubilee Claim, Ymir, Nelson Mining Division, West Kootenay, B.C.

412. Pyrite.

Blackcock Claim, Ymir, Nelson Mining Div., West Kootenay, B.C. } ...*Samuel H. Long, Rossland, B.C.*

433. Galena and pyrite.

Silver Lake Claim, Ymir, Nelson Mining Division, West Kootenay, B.C. } ....*P. J. Gleazer, Ymir, B.C.*

512. Galena and quartz.

Dumas Claim, Ymir, Nelson Mining Division, West Kootenay, B C.

398. Galena and pyrite.

Chehalis Claim, Ymir, Nelson Mining Division, West Kootenay, B.C. } ....*P. J. Gleazer, Ymir, B.C.*

513. Galena and quartz.

Willcock Claim, Ymir, Nelson Mining Div., West Kootenay, B.C. } ....*K. E. McKenzie, Ymir, B.C.*

432. Galena and pyrite.

Ben-Hur Claim, Ymir, Nelson, Mining Div., West Kootenay, B.C.

389. Ferruginous argillite.

Tamarac Claim, Ymir, Nelson Mining Div., West Kootenay, B.C. .... *R. McFarlane, Ymir, B.C.*

440. Auriferous pyrite.

Fairmount Claim, Ymir, Nelson Mining Division, West Kootenay, B.C. .... *John Carroll, Nelson, B.C.*

404. Pyrite.

Ymir Bell Claim, Ymir, Nelson Mining Div., West Kootenay, B.C. .... *J. S. Masterson, Nelson, B. C.*

391. Pyrite.

Lost Boy Claim, Ymir, Nelson Mining Div., West Kootenay, B.C. .... *W. J. Hughes, Ymir, B.C.*

392. Pyrite.

Dundee Claim, Ymir, Nelson Mining Division, West Kootenay, B.C. *Dundee Mining Company, Rossland, B.C.*

431. Pyrrhotite.

Porto Rico Claim, Ymir, Nelson Mining Division, West Kootenay, B.C. *Can. Pac. Exploration Co. Nelson, B.C.*

438. Pyrrhotite and chalcopyrite.

Nell K. Claim, Ymir, Nelson Mining Division, West Kootenay, B.C. ....*Finley McLeod, Nelson, B.C.*

393. Pyrrhotite.

Hidden Treasure Claim, Ymir, Nelson Mining Div., West Kootenay, B.C. *Geo. W. Richardson, Rossland, B.C.*

396. Auriferous ore.

Ymir Mine, Ymir, Nelson Mining Div., West Kootenay, B.C. ....*Ymir Gold Mine Co., Ltd.*

766. Auriferous quartz with sphalerite.

766*a*. Galena and sphalerite.

766*b*. Auriferous quartz with galena.

766*c*. Auriferous quartz with pyrite.

The ore of this mine consists of quartz with galena, pyrites and blende carrying silver and gold values. The vein is worked by three drifts, and the mine is being well developed.

Exchequer Claim, Nelson Mining Division, West Kootenay, B.C. } .... *Exchequer Gold Mining Co.*

437. Auriferous ore.

Clarence Claim, Nelson Mining Div., West Kootenay, B.C. } .... *J. A. Gilkin, Nelson, B.C*

408. Galena and pyrite.

Queen Group, Wolf Creek, Nelson Mining Division, West Kootenay, B.C. } *Messrs. Waldie and Turner, Nelson, B.C.*

390. Pyrite.

Henderson Claim, McMurdo Creek, Golden Mining Div., East Kootenay, B.C. } ....*Geological Survey.*

1179. Auriferous quartz.

Lexington Claim, Porcupine Creek, Golden Mining Division, East Kootenay, B.C. } *Messrs. Wells Bros., Rossland, B.C.*

962. Pyrite in quartz.

Mogul Claim, Spillimachene Middle Fork, Golden Mining Division, East Kootenay. B.C. } ....*John Henderson, Golden, B.C.*

963. Pyrite in quartz.

Flying Dutchman Claim, Spillimachene Middle Fork, Golden Mining Div., East Kootenay, B.C } ......*Messrs. Foster & McDermott.*

970. Pyrite.

The country-rock is composed of the slates common to the district through which cuts a quartz vein three to four feet thick, containing patches of iron sulphides. The gold values depend entirely on the quantity of sulphides, as the quartz carries no free gold.

R. E. Burns Claim, Spillimachene Middle Fork, Golden Mining Division, East Kootenay, B.C. } ....*R. Fotheringham, Ottawa, Ont.*

980. Pyrite in quartz.

This claim is situated near the centre of the Bobbie Burns Basin. The milling ore of this basin consists of quartz ledges carrying varying quantities of iron sulphides with gold values. The coun ry-rocks are slates and schists, and the quartz veins are from one to four feet wide. The gold values are in the sulphides. A mill run on 70 tons of ore is said to have yielded 2 dwt. 3 grs. of fine gold per ton on the plates, while the tailings containing the sulphides were much richer.

International Claim, Spillimachene Middle Fork, Golden Mining Division, East Kootenay, B.C. .... *J. Spink & Co., Toronto, Ont.*

983. Pyrite in quartz.

On this claim are two strong quartz ledges traceable for several hundred feet. On these some development work has been done. The chief ource of mineralization is the iron sulphides which carry gold values. The Favorite claim (No. 958) is adjacent to the International, and the quartz ledges are supposed to extend into it.

Favorite Claim, Spillimachene Middle Fork, Golden Mining Division, East Kootenay, B.C. *Messrs. Stark & Dainard, Golden, B.C.*

958. Pyrite in quartz.

Highland Mary Claim, Burns Basin, Golden Mining Division, East Kootenay, B.C. .. .. *H. E. Forster, Golden, B.C.*

957. Pyrite in quartz.

Bald Mountain Claim. Quartz Creek, Golden Mining Division. East Kootenay, B.C. *Bald Mountain Mining Co., Calgary, N.W.T.*

965. Auriferous quartz.

Thunder Hill Claim, Upper Columbia Lake, Windermere Mining Div., East Kootenay, B.C. *Thunder Hill Mining Co., Victoria, B.C.*

950. Pyrite in quartz.

Big Chief Claim, Boulder Creek, Fort Steele Mining Division, East Kootenay, B.C. .... *A. B. Grace, Fort Steele, B.C.*

783. Galena, chalcopyrite and pyrite in quartz.

Old Abe Claim, Bull River, Fort Steele Mining Division, East Kootenay, B.C. ..... *R. O. Jennings, Fort Steele, B.C.*

552. Auriferous ore.

Gold Bug Claim, Perry Creek, Fort Steele Mining Division, East Kootenay, B.C. } . . *N. A. Wallinger, Fort Steele, B.C.*

778. Gold quartz.

Aldine Claim, Horseshoe Canon, Fort Steele Mining Division, East Kootenay, B.C. } .... *J. Mean, Fort Steele, B.C.*

550. Ferruginous veinstone.

Rossland Claim, Skookumchuck Creek, Fort Steele Mining Div., East Kootenay, B.C. } .... *J. Mean, Fort Steele, B.C.*

1017. Auriferous pyritous ore.

ONTARIO.

The Archæan rocks of the northern and western parts of Ontario include numerous and extensive areas of Huronian rocks. In these latter are found numerous veins, the auriferous nature of which in many places had been known for years.

The gold mining industry of the province had not until lately assumed large proportions. Within the last few years, however, and coincident with the general expansion of the metal mining industries of the country, mining has been successfully revived in some of the older districts, and new districts have been discovered, so that at present a large number of the gold-bearing veins of this province are being exploited, and in many instances have already been placed on a paying basis.

The chief centres of activity lie around Lake of the Woods, Shoal Lake, Rainy Lake, Seine River, Shebandowan, west of Thunder Bay, and exploratory work is progressing east of that point at Jackfish Bay and Michipicoten, on the north shore of Lake Superior, and around Wahnapitae Lake, north of Sudbury. In the older portions of the province also, in the counties of Hastings and Frontenac, several veins are being exploited.

Most of the districts yield free-milling ores while at other points, notably in the case of a number of the veins in Hastings county, the association with arsenical pyrites renders the extraction of the metal more difficult.

In 1891 the value of the gold produced in the province was about $2,000 only, but in 1899 it amounted to over $420,000.

Mikado Mine, Shoal Lake, Lake of the Woods, Ont. } *Mikado Gold Mining Co., London, Eng.*

160. Auriferous quartz.

363. Auriferous quartz, showing free gold.

The ore of the Mikado mine is of unusual richness, and this has given prominence to the Shoal Lake (west) region.

The formation consists of greenstone with areas of intrusive granite. The main vein is partly in the contact betw en the granite and the greenstone and partly in the granite. It was found to have an average thickness of four feet in the mine. On vein No. 2 an incline has been sunk. This vein at the surface proved to be only two inches thick, and assayed $200 per ton. On sinking on it, it was found that it widened, until at 65 feet it was six feet wide and value had decreased almost in proportion. The hoisting and tramming equipments are very complete and the stamp-mill consists of four batteries of five stamps each, crushers, amalgamating pans, etc. A cyanide plant is under construction. The main shaft is now down 240 feet.

The mine comprises locations D 147, 148 and 149.

Bullion Mine, Lake of the Woods, Ont. } *Bullion Mining Co. of Ontario, Rat Portage, Ont.*

362. Auriferous quartz.

This mine adjoins the Mikado. It is situated on location D 233. Development is being pushed actively and machinery is being put in.

Great Granite Mine, Echo Lake, Lake of the Woods, Ont. } *The Great Granite Gold Mining and Development Co. of Ontario, Toronto and Buffalo.*

364. Auriferous quartz.

The company owns. several thousand acres in the vicinity of the Mikado property. Development has been done on several locations. So far the best showings are on No. E 272.

Sirdar Mine, Shoal Lake, Lake of the Woods, Ont. } *Toronto and Western Mines Development Co. of Ontario, Toronto, Ont.*

358. Auriferous quartz.

358*a*. Siliceous hornblende-schist.

The Sirdar mine is on location D 410, and adjoins the Mikado (see No. 160), The formation is granite, a part of the same body that occurs on the Mikado property The vein is said to be three to seven feet wide and the ores are favorably reported on. Some development work has been done. The veinstone consists of altered granite impregnated with quartz and pyrite.

Sirdar Point, Shoal Lake, Lake of the Woods, Ont. } *Toronto and Western Mines Development Co. of Ontario, Toronto, Ont.*

359. Auriferous quartz.

Sirdar Peninsula, Shoal Lake, Lake of the Woods, Ont. } *Sirdar Gold Mining Co., Toronto, Ont.*

308. Gold in schistose veinstone.

308*a*. Ore from vein No. 5.

308*b*. Ore from vein No. 7.

Claim D 410, Sirdar, Shoal Lake, Lake of the Woods, Ont. } *Sirdar Gold Mining Co., Toronto, Ont.*

309. Gold in quartz.

Triggs Mine, Lake of the Woods, Ont. } *Triggs Gold Mining Co. of Ontario, Rat Portage, Ont.*

288. Auriferous quartz, with pyrrhotite and chalcopyrite.

This property consists of three locations, McA. 56, 129 and 148, aggregating 113 acres. The rich ore consists of zones of quartz and greenstone mixed, extending along the top of the hill, with a strike nearly east-and-west. There are two of these veins, one on the north and the other on the south side of the hill, about 150 feet apart. The quartz in the veins assays well, and the greenstone between them also contains some gold.

Wimor Mine, Rat Portage, Ont...... } *The Rainy River Gold Mining Co., Rat Portage, Ont.*

282. Auriferous quartz.

Black Sturgeon Mine, Rat Portage, Ont. } *Messrs. P. Culligan and F. W. Gilchrist, Rat Portage, Ont.*

281. Auriferous quartz.

This property comprises lots 11 and 12 Jaffray township; the discovery was made in 1896. The country-rock is granite and slate with occasional areas of greenstone.

Treasure Mine, Rat Portage, Ont...............*A. B. Upton, Rat Portage, Ont.*

274. Auriferous quartz, showing pyrrhotite.

Scramble Mine, Lake of the Woods, Ont. } *The Scramble Gold Mining Co. of Ontario, Rat Portage, Ont.*

271. Auriferous quartz.

This mine is near Rat Portage, on lots 13 and 14 of Jaffray township. The deposit is an excellent example of a fahlband. The rock is mica-

schist or mica-chlorite-schist, and the vein-rock differs from the adjoining country-rock mainly in being heavily impregnated with pyrites.

The main vein has a strike of northeast and southwest, and can be traced six hundred and fifty yards. There is a width of thirty feet of ore.

Nora Mine, Lake of the Woods, Ont. } *The Maple Leaf Gold Mining Co., Chatham, Ont.*

280. Auriferous quartz, showing pyrite and nickeliferous or cupriferous stains.

Victoria Mine, Lake of the Woods, Ont. } *The Rainy River Gold Mining Co., Ltd., Rat Portage, Ont.*

283. Auriferous quartz.

Gold Hill Mine (now Britannia Mine) Big Stone Bay, Lake of the Woods, Ont. } *Britannia Gold Mining Co.—B. Sawyer, Westmount, Que.*

159. Auriferous quartz.

The vein here is a fissure vein of white quartz with sulphides, in a greenish massive-looking country-rock, which, under the microscope, appears to consist mainly of hornblende, replacing a weathered augite. The shaft at this mine is 125 feet. There is a ten-stamp mill with Frue vanners and amalgamators.

Claim No. 281, Lake of the Woods, Ont. } *L. Wiley Ward, Pleasantville, Pennsylvania.*

213. Auriferous quartz.

Pixley Claim No. 72, Lake of the Woods, Ont. } *Mrs. Hopkins, Pleasantville, Pennsylvania.*

212. Auriferous quartz.

Peggy Claim, No. 282, Lake of the Woods, Ont. } *A. B. Blackington, Michipicoten, Ont.*

217. Auriferous quartz.

Lyla Claim, Lake of the Woods, Ont....... *R. W. Edey, Michipicoten, Ont.*

210. Auriferous quartz.

Sultana Mine, Lake of the Woods, Ont. } ...*J. F. Caldwell, Winnipeg, Man.*

158. Auriferous quartz.

367. Auriferous quartz.

This mine, which is the steadiest producer of Western Ontario, is situated on Location 42 X, comprising an area of 27 acres. The patent was issued in 1888; in 1890 J. F. Caldwell became the owner. It is now operated by a company. Prospecting was begun in 1890 and active mining in 1892; since then the mine has been operated continuously.

The ore is a quartz enclosed in a chloritic and hornblendic schist of Keewatin age. The ore-bodies of importance include the Crown Reef fissure vein and two lenses, one of which, at the widest point known is 66 feet wide.

The mill, to which important additions were made in 1898, consists of thirty stamps, six Frue vanners, chlorination plant, etc. It has a capacity of 80 tons per 24 hours. The shaft is down 400 feet, and development work is kept well ahead of winning.

Swede Boys Mine, Little Turtle Lake, Lake of the Woods, Ont. } *The Headlight Gold Mining and E ploration Co., of Ontario, Mine Centre, Ont.*

365. Auriferous quartz.

This is on location 238E, situated about eight miles from Mine Centre. Work has been done on a fahlband of dark schist, with interbedded quartz.

Lake of the Woods, Ont..................................*Ontario Bureau of Mines.*

361. Auriferous quartz, from various mines.

Lizzie Mine, Sturgeon Lake, Lake of the Woods, Ont. } *The Virginia Gold Mining Co. of Ontario, Rat Portage, Ont.*

366. Auriferous quartz.

Crown Point Mine, Lake of the Woods, Ont. } *Crown Point Mining Co., Lake of the Woods, Ont.*

737. Auriferous quartz.

Sandy Lake, near Minnietakie Lake, Ont. } *Ruby Reef Mining Co. London, Ont.*

738. Auriferous pyrite.

This specimen is from location H. W. 409.

Triumph Mine, Haycock township, Lake of the Woods, Ont. } ......*Col. Engledue, London, Eng.*

155. Auriferous quartz.

On locations X 33 and P 247. This property is situated eight miles southeast of Rat Portage. The vein is quartz in a country rock of

greatly altered green diabase. Large quantities of sulphides are carried in the quartz, as well as some free gold. A shaft has been sunk 226 feet.

Regina Mine, Lake of the Woods, Ont. } *Regina Gold Mining Co., of London, England.*

153. Auriferous quartz.

360. Auriferous quartz, showing free gold.

This is on locations 566P and 567P. On the former location there are three fissure veins. The main vein runs north-and-south, the north part being in granite and the south part in greenstone. The shaft is sunk near the contact between the granite and the trap. The average width of solid quartz is four to five feet. In 1898 the main shaft was down 452 feet, the size being 6 x 10 feet. Tunnelling and drifting to the amount of 2240 feet had been done. The mill is now equipped with seven two-stamp batteries (Tremaine steam stamp) replacing the old gravity stamps. There is a complete cyanide plant.

Mephisto Claim, Lake of the Woods, Ont. } ....*D. S. Culbert, Wawa, Ont.*

215. Gold ore containing copper-pyrites.

Lincoln Claim, No. 451, Lake of the Woods, Ont. } *A. F. Brown, Sault Ste. Marie, Ont.*

214. Gold ore containing pyrrhotite and copper-pyrites.

Lily of the West Claim, Lake of the Woods, Ont. } ....*John Noel, Wawa, Ont.*

216. Gold ore containing copper-pyrites.

Location K 65, Shebandowan Lake, Thunder Bay District, Ont. } *Messrs. Hammond, Folger, McMillan, and Mackenzie.*

759. Gold ore containing copper-pyrites.

This location is situated east of Round Lake. On it two shafts are reported to have been sunk to a depth of 50 feet.

Lower Neepawa Mine, Manitou Lake, Ont. } *Neepawa Gold Mining Company of Ontario. Rat Portage Ont.*

273. Auriferous quartz.

This mine is situated on the northwest shore of the Lower Manitou Lake and consists of Location, H. W. 54, which contains 40 acres. The formation is chloritic schist.

Victory Mine, Manitou Lake, Ont... ....*Gold Reefs Co., Ottawa, Ont.*

289. Auriferous quartz, showing chalcopyrite.

The Victory Mine (location Mc. 28) is near Triggs. Some exploratory work has been done. The quartz at one place showed a width of 35 feet, but the ore is low grade.

Foley Mine, Shoal Lake, Rainy River District, Ont. } *Foley Gold Mining Co. of Toronto, Toronto, Ont.*

154. Auriferous quartz, four specimens.

The Foley mine is the largest of the mines of the Shoal Lake or Lower Seine River country. The property consists of three locations. The formation is protogine, containing a great many quartz veins. On this property thirty-two have been discovered with a number of stringers. Eleven shafts have been sunk on different veins, but work is now confined to the north shaft, on Bonanza vein, which is down 420 feet, with levels and other underground work. In the shaft, to the 200-foot level, the vein varies from 13 to 19 inches in width. Below this it averages about four feet, showing a considerable improvement.

The surface equipment consists of a twenty-stamp mill with concentrating machiney ; a tramway 4,380 feet long runs from the vein to the mill.

Olive Mine, Lower Seine River, Ont. } *The Olive Gold Mine Co. of Lower Seine, Ltd., Winnipeg, Man.*

284. Auriferous quartz.

This property, comprising locations G 60 and G 61, is situated on the southern shore of the western end of Little Turtle Lake. There are two veins crossing the locations. That upon which most work has been done consists of a narrow but rich quartz vein, with greenish schist about a foot wide on each side, and also auriferous.

In January, 1899, the main shaft was down 223 feet and some three hundred feet of drifting had been done. A ten-stamp battery is installed.

Claim S. V. 229, Lake Minietakie, Ont......*O. W. Whiting, Wabigoon, Ont.*

272. Auriferous quartz.

Island Falls, Seine River, Ont..........*James Hammond, Fort William, Ont.*

249. Auriferous quartz.

Decca Mine, Lower Seine, Ont...................*Decca Mining Co. of Montreal.*

275. Auriferous quartz, showing pyrite and galena.

This location (K 222) comprises forty acres, situated three miles north of Mine Centre. The formation is protogine. A number of quartz veins of variable width cross it. Development work is in progress on two fissure veins, ranging in width from a few inches to six or seven feet.

Lucky Coon Mine, Lower Seine, Ont. } *Lucky Coon Gold Mining Co., Mine Centre, Ont.*

290. Auriferous quartz, showing galena.

This property is situated north of the eastern end of Shoal Lake, about midway between that lake and Vermilion Lake. It consists of location 655 P, comprising 167 acres. There are two large veins and a number of stringers, the ore being quartz rather heavily charged with sulphides. A small five-stamp mill was erected on the property and worked for about one month. There was no plant, however, to concentrate and treat the sulphides.

Manhattan Mine, Lower Seine, Ont. } *Manhattan Gold Mining Co. of Canada, Montreal, Que.*

277. Auriferous quartz.

Golden Crescent Mine, Lower Seine, Ont. } *Golden Crescent Mining and Exploration Co.*

279. Auriferous quartz.

Alice A. Mine, Lower Seine, Ont... } *American-Canadian Gold Mining Co., Duluth, U.S.*

285. Auriferous quartz.

This mine is on location K 191, formerly known as Archibald's location, lying north of Wild Potato Lake, a few miles from Mine Centre. It comprises about 80 acres. The country-rock, according to Dr. Coleman, is a felsite-schist of Keewatin age. The veins are irregular, but the country-rock itself is reported to carry gold. A mill-run on a ten-ton sample of the ore was made at the Olive mine mill, giving value of $11.38 per ton. A two-stamp Tremaine mill was installed in 1899.

Gold Bug Mine, Lower Seine, Ont. } *Gold Bug Gold Mining Co. of Ontario, Mine Centre, Ont.*

276. Auriferous quartz, showing galena and chalcopyrite.

The Gold Bug Mine adjoins the Alice A.

Ferguson Mine, Lower Seine, Ont. } *Golden Crescent Gold Mining and Exploration Co., Mine Centre, Ont.*

278. Auriferous quartz.

On mining locations AL 110, AL 111, and K 223. It is situated in an area of protogine granite. There are eight veins on the property, three of which deserve attention, one of these measuring from 2 to 3½ feet. Work was begun in 1895, and a small three-stamp mill has been erected.

Golden Star Mine, Lower Seine, Ont. } *Golden Star Mining and Exploration Co. of Ontario, Toronto, Ont.*

287. Auriferous quartz, with galena and chalcopyrite.

This property consists of locations AL 114 and 116, situated 4½ miles from Mine Centre. The country-rock is a green schist, diorite and very fine grained greenstone. The ore-body consists of a large felsite dyke and a number of small quartz veins a few inches wide, that occur at different places on the property. The veins are rich, although only considered of secondary importance on account of their size. The main ore body is the dyke, which is called the "Hunky vein." Quartz occurs in this dyke in lenticular bodies. A mill-test of 500 lbs. taken from across the dump yielded $49 to the ton and was 80 per cent. free milling. In January, 1899, the shaft had reached a depth of 376 feet, and there were some 800 feet of drifting completed. A stamp-mill has been erected at a distance of half a mile from the mine, to which the ore is carried by an Otto aerial tramway.

Location 393 X, Seine River, Ont.... } *Sirdar Gold Mining Co., Toronto, Ont.*

310. Auriferous quartz.

Sawbill Mine, Upper Seine, Ont.... } *Sawbill Gold Mining Co., Hamilton, Ont.*

156. Auriferous quartz.

Mining location 313 X. The country-rock is an altered granite, and bands of green schist occur in places. Several veins have been found. The main one or Sawbill vein contains pyrite, chalcopyrite, galena and some free gold. Two 5-stamp batteries and concentrating machinery have been erected. In November, 1898, the shaft was down 250 feet, and 650 of drifting was done.

Hammond Reef, Upper Seine, Ont. } *Hammond Reef Gold Mining Co. of Toronto, Ont.*

197. Auriferous quartz.

The discovery of the reef was made by an Indian who brought it to the notice of Mr. Hammond. The reef is traceable on locations 316 X to 321 X, and also on 337 X and 338 X. The reef consists of a zone of

greatly shattered and altered granite, in which quartz being deposited in the interstices, acts as a cement. It has been traced three or four miles and has a general direction north-east and south-west. The boundaries are indefinite, but as near as can be ascertained, it is 462 feet wide at the widest and 100 feet at the narrowest.

Several mill-runs have yielded from $6 to $7 a ton. A 10-stamp mill has been running since October, 1897. This is too small to deal with a large body of low-grade ore, and is really only a test mill. So far only open-cast work has been done, and the results are said to be satisfactory. The workings and the mill are connected by tramway.

Independence Mine, Manitou Lake, Ont. } *Manitou Lake Gold Mining Co. of Minnesota, Wabigoon, Ont.*

286. Gold in quartz.

This property consists of S. ½ lot 11, con. 3, and parts of lots 11 and 12 con. 2, Bennett township. The formation is mainly sericite and felsite schists, similar to that of the Olive and Alice A. mine. The three mines, which are in line, are probably situated on the same belt of schists. The Independence is about 20 miles east of the Olive. It contains small but very rich quartz streaks and a test of the country-rock or schists taken adjacent to the pay-streak gave $7.35 per ton. The pay-streak itself is reported to average $145 per ton. A 5-stamp mill has been erected.

Location H W 416, New Klondike, Ont. } *Hon. Rob. Watson, and J. M. Monroe, Manitoba.*

241. Auriferous quartz.

241*a*. " "

241*b*. " "

The New Klondike district comprises that part of the country which lies south of the Canadian Pacific Railway, between the stations of Taché and Brulé. The most promising part of the district is a few miles to the south of the railway and comprises only a few square miles. The formation is principally felsite, but trap also occurs to a certain extent, and the contact with the granite is within three or four miles of the track. Location H. W. 416, from which the above specimens come, consists of forty acres.

Lake of the Woods, Ont.............................. *E. May, St. Catharines, Ont.*

208. Auriferous iron-pyrites.

Harper Claim, No. 325, Lake of the Woods, Ont. ......*R. W. Edey, Michipicoten, Ont.*

209. Auriferous iron-pyrites in quartz.

Huronian Mine, Lot H 1, Moss Township, Thunder Bay, Ont. ....*Geological Survey.*

191. Auriferous quartz, with silver, tellurium, antimony and lead.

The Huronian mine is situated near the centre of Moss township. The country-rock at the mine consists of green chloritic schists. The vein is from six to eight feet in width and can be traced for a considerable distance. The quartz carries pyrite, chalcopyrite, galena, sylvanite, and some free gold. In 1872, two hundred tons of ore was taken out. A ten-stamp mill with concentrating machinery was erected in 1883, as well as a chlorination plant. The mill has been closed since 1885. With improved facilities for transport resumption of work on the property should be possible.

Empress Mine, Jackfish Bay, Lake Superior, Ont. *Empress Gold Mining Co., Fort William, Ont.*

157. Auriferous quartz.

This property consists of location R 569, and the associated lots R 567 and R 568, each containing 160 acres. Location 569 has been sold to the Empress Gold Mining Co., organized in 1896. Extensive prospecting has been done on four veins of from four to eight feet wide. A ten-stamp mill was erected. Work is at present suspended.

Y 103, Michipicoten, Ont................................ *J. J. Mackey, Wawa, Ont.*

211. Auriferous quartz, with visible gold.

This location is on the south shore of Wawa Lake; it was discovered by an Indian. It is now in the hands of J. J. Mackey and J. L. Caverhill. It was the first discovery in the region. There are several veins, and good assays are reported.

Michipicoten, Ont........................ *Diamond Jubilee Mining Development Co. of Ontario, Toronto, Ont.*

109. Auriferous quartz.

Mariposa Claim, No. 319, Michipicoten, Ont. .... *W. H. Lewis, Detour, Mich.*

218. Auriferous quartz.

Leckie Mine..*Orford Copper Co., New York.*

238. Blende and pyrite (auriferous.)

Net Lake, Lake Temagami, Ont........................*Ontario Bureau of Mines.*

725. Arsenopyrite and pyrite.

This deposit is said to assay high in arsenic, with good values in gold. The ore is found in transluscent quartz, which occurs in numerous veins and lenses in areas characterized by the presence of Huronian rocks and their associate eruptives.

Belmont Mine, Belmont township, S. E. ¼ Lot 21, Con. I, Peterborough Co., Ont. } *Cordova Exploration Co., Marmora, Ont.*

231.	Auriferous	quartz,	2½ oz.	per ton.
231*a*.	"	"	3	"
231*b*.	"	"	1½	"
231*c*.	"	"	1	"
231*d*.	"	"	10 dwts. (about average.)	

Development is being actively pushed at this mine, there being four shafts sunk and several hundred feet of drifting completed. A ten-stamp mill has been erected with concentrating machinery.

Ledyard Mine, Belmont township, E. ½ Lot 19, Con. I, Peterborough Co., Ont. } *Ledyard Gold Mining Co., Toronto, Ont.*

152. Auriferous quartz.

The vein occurs in chloritic and talcose schist. There is a Huntingdon mill having a capacity of twenty tons a day. Assays of the vein-matter have given results averaging about $12 per ton. Another vein on the property (the Clarke vein) is said to have yielded assays of $23 per ton.

Deloro Mine, Deloro, Marmora township, Hastings Co., Ont. } *Canadian Gold Fields Co., Marmora and London, England.*

242. Mispickel (auriferous).

151. Mispickel in quartz.

This property, which comprises 525 acres, is situated one mile from the station of the Central Ontario Railway at Marmora. The deposit which is worked is not a defined vein, but a shattered zone of the country-rock,

in the fissures and spaces of which have been deposited quartz, calcite, mispickel, copper-pyrites and iron-pyrites. The general band of ore-bearing shattered rock can be followed a long way. It averages, perhaps, five feet, running from a minimum of less than one foot to a maximum of about twenty-five feet. Free gold shows itself occasionally, generally in the quartz. The highest gold contents, however, are given by a mixture of fine-grained arsenical pyrites with quartz.

The works are somewhat extensive. There are two working shafts and one air shaft, as well as over 1,100 feet of tunnelling and cross-cutting. The mill is well equipped and efficient. The bromo-cyanide process is used. Twelve samples analyzed gave an average of $39.47 per ton.

Actinolite, Hastings Co., Ont........................*Joseph James, Actinolite, Ont.*

220. Mispickel (auriferous) No. 2.
220*a*. " " No. 3.
220*b*. " " No. 4.
220*c*. " " No. 5.

Diamond Mine, Madoc township, Lot 14, Con. X, Hastings Co., Ont. ....*D. E. K. Stewart, Madoc, Ont.*

171. Biotite-gneiss with auriferous stringers of quartz, from north vein.

172. Pyrite in quartz, auriferous. South vein.

The Diamond mine is situated eight miles north-east of Madoc village.

Elzevir township, Lot 25, Con. IV, Hastings Co., Ont. ....*Ontario Bureau of Mines.*

678. Auriferous and argentiferous quartz carrying copper-pyrites, galena and tetrahedrite.

Helena Mine, Barrie township, Frontenac Co., Ont. ....*A. W. Chisholm, Tweed, Ont.*

673. Auriferous quartz with copper-pyrites, tetrahedrite and pyrite.

Boerth Mine, near Plevna, Frontenac Co., Ont. *The Boerth Mining Co., Clarendon, Ont.*

205. Auriferous quartz.

Little Doris Mine, Clarendon township, Frontenac Co., Ont. .... *T. J. Watters, Ottawa, Ont.*

672. Auriferous quartz with copper-pyrites, bornite, tetrahedrite and pyrite.

Assays are reported as yielding: Gold $10.14, silver $5.75, copper 1.87 per cent.

NOVA SCOTIA.

In Nova Scotia the gold-bearing rocks form a broad belt varying in width from ten to seventy miles and extending some 260 miles in length along the whole Atlantic coast. They cover about half the area of the province, exclusive of Cape Breton Island, and their area may be roughly estimated at 8,500 square miles. Of this area, however, probably 3,500 square miles are occupied by granite, leaving about 5,000 square miles of gold-bearing rocks. These rocks are believed to be of Lower Cambrian age, and consist of a lower or quartzite group and an upper or slate group. The lower division has a total known thickness of 16,000 feet and consists principally of compact white-weathering, greenish-grey felsitic quartzite, sometimes approaching sandstone in character and often pyritous, interstratified with numerous beds of bluish and greenish argillaceous slate. The upper division, over 11,000 feet thick, is mostly composed of rusty-weathering, bluish-black slates, pyritous, underlain by greenish argillaceous and chloritic soft slate.

These rocks have been folded into a series of synclines and anticlines roughly parallel with the coast line, the folds having an average distance of three miles apart. At intervals of ten to twenty-five miles the anticlines pitch in opposite directions, at low angles, thus forming long elliptical domes. On these domes the folding has loosed and opened up the strata along the planes of sedimentation, creating a succession of superimposed saddle-shaped veins along the axial planes of the folds. Extensive denudation has then worn down the gold-bearing rocks to the present surface, and the anticlinal folds have been truncated at different horizons to a known depth of 27,000 feet. Of all the domes more than half have already been worked and form some fifty separate limited mining centres at different horizons in the lower or quartzite group. Mining operations have so far been limited to veins outcropping at the surface, and have not reached a greater depth than 700 feet. Although often conducted unskilfully they have been remunerative. Recent study by the Geological Survey has proved conclusively, however, that auriferous saddle-veins occur in depth one below the other, on the anticlinal domes, like the saddle reef of Bendigo, Australia, which are mined so extensively to depths reaching 4,000 feet. This succession of saddle-veins presents a most important field for deep and permanent mining. Not only do saddle-veins recur in depth one below the other, but portions of special enrichment at the surface will undoubtedly be succeeded

downward by others of equal richness, in well defined pay-zones extending to great depths in a direction approximately parallel with the axial plane of the fold, which can be readily determined by systematic and well directed development.

As a general rule the greater part of the gold occurs in the veins as visible grains and nuggets, and the ore is free-milling, but many of the veins contain a large proportion of auriferous sulphides which have often been overlooked.

Besides the anticlinal systems of interlaminated veins above described, several auriferous quartz veins cutting the stratification at various angles have been worked, for the most part in the upper or slate group, and many have proved good permanent producers.

Owing to the small amount of superficial deposits remaining in the gold region of Nova Scotia, alluvial mining is almost unknown, although in several cases the earth at the crops of the veins has been found to be rich. Gold was first discovered in Nova Scotia in 1859, and in 1862 upwards of seven thousand ounces were obtained. Since that time the annual average yield for the province has been remarkably constant. The yield for the year 1899 was 27,900 ounces.

Owing to its great purity the gold sells at about $19.50 per ounce, although officially valued at only $18.

Goldenville District, Guysborough Co., N.S. .... *G. Hirschfield, Sherbrooke, N. S.*

865. Gold concentrates.

Over fifty-five different interlaminated veins have been worked or uncovered in this district, in a width of strata of 13,000 feet, on the northern side of an anticlinal dome pitching to the west, and some fifty veins in a width of 500 feet, on the southern side. The productive part of the district extends over 8,000 feet in length along the anticlinal axis. Pay-shoots or portions of special enrichment have been met with at the surface in most of the veins, along certain lines forming well-defined pay-zones. Many of these pay-shoots have already been mined extensively to depths reaching 600 feet, with good results.

In many cases, series of veins lie near enough to each other to be worked together and systematic developments carried on along the zones of pay-shoots will no doubt insure important, deep and permanent mining. The district has produced about 132,000 oz., which is more than double the yield of any other gold district of the province.

Isaacs Harbour, Guysborough Co., N.S............*N. S. Department of Mines.*

842. Auriferous quartz.

Auriferous quartz veins have been developed on three separate domes occurring on the different anticlines which cross this harbour. The famous Richardson vein, from 6 to 20 feet thick, has been extensively

worked on the curve of the eastern pitch of the north dome. Several important series of veins, such as the Mulgrave, Hurricane Point and North Star, have been worked successfully on the middle dome. Only a few veins have so far been developed on the south dome at Dung Cove. This district has produced about 40,000 ounces,

Wine Harbour, Guysborough Co., N.S............*N. S. Department of Mines.*

827. Auriferous quartz.

All the veins uncovered and operated in this district are interlaminated veins situated on the south dip of an anticlinal dome. This specimen is from a rich shoot of ore worked on the "Plough" lead. This district has produced about 24,000 ounces.

Lawrencetown, Halifax Co., N.S...................*J. Townsend, Tangier, N.S.*

876. Auriferous quartz.

Three separate systems of saddle-veins have been more or less developed on three different anticlinal folds occurring in this district, within a breadth of 2,500 feet of gold measures. No veins have so far been worked to depths exceeding 70 feet. The belt worked here at present contains about ten tons of crushing material per 100 feet of wall surface, giving an average of about $20 per ton.

Lawrencetown, Halifax Co., N.S..............*J. H. Townsend, Tangier, N.S.*

882. Wall rock and working belt.

882*a*. Slate with mispickel.

From the Wadlow lead.

Lawrencetown, Halifax Co., N.S............. *J. H. Townsend, Tangier, N.S.*

880. Auriferous quartz.

896. Wall rock.

Caribou, Halifax Co., N.S............. *Guffey-Jennings Mining Co., Caribou, N.S.*

866. Auriferous quartz with pyrrhotite.

866*a*. Auriferous quartz.

Several interlaminated veins have been uncovered on both sides of the elliptical dome forming this district, but only a few have been operated to any extent. The most important mining operations have occurred on four different fissure veins, cutting the stratification at small angles at

distances of not more than 1,700 feet from the anticline. One cuts the quartzite group, and the other three cut the slate group near its base. The one operated on the Guffey-Jennings property and that worked on the Elk property have proved steady producers. The yield of this district, including that of Moose River, has been about 39,500 oz.

Caribou, Halifax Co., N.S.........................*Elk Mining Co., Caribou, N.S.*

869. Auriferous quartz.

869*a*. Concentrates.

Waverley, Halifax Co., N.S............................*N. S. Department of Mines.*

824. Auriferous quartz.

Over sixty interstratified veins have been uncovered on the western pitch of an anticlinal dome extending for a length of 6,000 feet and a width of 1,500 feet. Several veins have been mined extensively, and the greatest depth attained is 628 feet. Series of parallel veins on the north dip lie near enough to each other to be advantageously worked together under a single management.

This district has produced 61,500 ounces of gold, which is more than the yield of any other gold district, except Goldenville.

Waverley, Halifax Co., N.S.......... *Messrs. T. R. Gue and B. C. Wilson, Halifax, N.S.*

874. Auriferous quartz (set in cement).

Montague, Halifax Co., N.S........... ....*N. S. Department of Mines.*

825. Auriferous quartz.

Several interlaminated veins have been developed on the north and south limb of a long narrow anticlinal dome extending for a length of 7,500 feet and a width of 2,200 feet. Mining operations have so far been confined to the south-dipping veins, many of which have produced high-grade ore. This district has produced nearly 40,000 ounces of gold, with an average yield of $32.77 per ton, the highest average yield of any district in the province.

Montague, Halifax Co., N.S............ *Messrs. Jack and Bell, Halifax, N.S.*

883. Gold (case of nuggets).

Montague, Halifax Co., N.S................... *W. C. Henderson, Halifax, N.S.*

881. Auriferous quartz.

Montague, Halifax Co., N.S. .... *Golden Group Mining Co., Montague, N.S.*

913. Gold specimen from the "Nugget Lead."

Dufferin Mine, Salmon River, Halifax Co., N.S. *Montreal Gold and Silver Development Co., Ltd., Montreal, Que.*

870. Auriferous quartz.

A system of large superimposed saddle veins has been extensively worked on a sharp anticlinal dome. The north and south limbs forming the first saddle have been worked for a length of 1,788 feet and stoped to an average depth of 150 feet, the greatest depth attained being 400 feet. Vigorous development is in progress. The mine has been equipped with a modern 60-stamp mill, with 23 Frue vanners of a capacity of 240 tons per 24 hours. The work undertaken here may be considered the first important step toward the initiation of a more comprehensive and scientific mode of mining in Nova Scotia.

This district has produced about 40,500 ounces.

Cow Bay, Halifax Co., N.S. .... *W. C. Sarre, Halifax, N.S.*

867. Auriferous quartz.

All the veins occurring in this new district cut the stratification at right angles. A few of them have recently been developed and found remunerative where they cross a band of schistose, felspathic quartzite, 100 feet wide, heavily charged with specks of pyrrhotite, and dipping south at an angle of 35 degrees.

South Uniacke, Hants Co., N.S ....*John J. Withrow, South Uniacke, N.S.*

864. Auriferous quartz.

864*a*. Concentrates.

This is one of the districts lately discovered. Only a few veins have so far been uncovered and but two of them have been worked. They follow the stratification on the north limb of a long narrow anticlinal dome, dipping north vertically and south horizontally. A rich and very regular pay-shoot, dipping east at a constant angle of 28 degrees, has been worked for a length of 2,000 feet, giving the high average yield of ten ounces to the ton.

South Uniacke and Mount Uniacke have together produced about 37,000 ounces.

South Uniacke, Hants Co., N.S ....*N. S. Department of Mines.*

873. Auriferous quartz.

From Eastville and Withrow Mines.

Mount Uniacke, Hants Co. N.S.......... } *Messrs. Cunningham and Curren, Halifax, N.S.*

902. Auriferous quartz.

902*a*. Concentrates.

This property is situated about 25 miles from Halifax, and is within three miles from a railway station. The area comprises some 240 acres. There are ten leads in the belt crossing the property, which have widths from 2 to 20 inches. The yield averages 4 to 5 dwts. of gold per ton of quartz.

Renfrew, Hants Co., N.S.............................*N. S. Department of Mines.*

823. Auriferous quartz.

A system of some fifty interlaminated veins has been developed on the south side of a broad anticlinal dome. Several of them have been opened along their outcrops, and many important pay-streaks have been extensively worked to depths reaching 350 feet.

This district has produced about 34,000 ounces.

West Gore, Hants Co., N.S....................*Messrs. McNeill, Halifax, N.S.*

819. Auriferous stibnite.

Assays by Mr. Mason of this ore, show 2.66 oz. of gold per ton of 2000 lbs. The vein from which it is derived is 18 inches to 6 feet in width.

Cashon - Hines Mines, Leipsigate, Lunenburg Co , N.S. } .. *Capt. J. Hines, Leipsigate, N. S.*

868. Auriferous quartz.

890. Concentrates.

The vein worked here is a fissure, with an average of 13 inches in width. It has been opened for 500 feet, by an incline driven at an angle of about 65 degrees.

Cranberry Head, Yarmouth Co., N. S....*J. D. Huntington, Yarmouth, N.S.*

879. Auriferous slate with arsenopyrite.

879*a*. Concentrates.

The lode on this property is lenticular. It is about 6 inches at the surface and is said to increase in width as depth is reached. About 15 dwts. can be saved by amalgamation and the same amount by concentration.

North Brookfield, Queen's Co., N.S. } *Brookfield Mining Co., W. L. Libbey, North Brookfield, N.S.*

878. Auriferous quartz.

878*a*. Wall-rock, slate and whin.

878*c*. Concentrates.

898. Photographs.

The Brookfield Mining Co. works a gold property of 104 acres, at North Brookfield. The average size of the vein worked is 14 inches, which yields about $17 per ton milled. The gold is saved partly by amalgamation and partly by concentration and chlorination.

Molega Barrens, Queen's Co., N.S. } *R. R. McLeod, Brookfield, Queen's Co., N.S.*

875. Auriferous quartz.

About a dozen gold bearing veins have been noticed on this property, the widest of which is four feet.

Nova Scotia................................ } *J. D. McGregor, M.P.P., New Glasgow, N.S.*

903. Quartz, three specimens valued at $100.

Guysborough Co., N. S.. *Geological Survey.*

1163. Sectional model of the gold district of Goldenville.

Gold, Smelting Ores.

British Columbia.

Gold smelting ores are being principally mined in the two camps Rossland and Boundary Creek, which lie about fifty miles apart near the southern boundary of British Columbia. During 1899 Rossland Camp produced 172,665 tons of ore. So far the work at Boundary Creek has been chiefly confined to developing the large ore-bodies there.

These ores are reduced in smelters situated, as at Trail and Northport, at favorable points, while others are being built in the Boundary district. The product is a copper-gold matte. The conditions for fuel and fluxes are favorable to cheap and effective work.

The southern portions of West Kootenay and Kettle River Districts contain many other smaller partly developed camps, and similar ores are also found at points on the Pacific coast as well as at Harrison Lake, Kamloops and other places.

As a class the more developed deposits of gold smelting ores consist of pyritous sulphides, often pyrrhotite and chalcopyrite and some arsenical

iron, as at Rossland. At Boundary Creek much magnetite and hæmatite are associated with chalcopyrite. The highest gold values run in chutes, the appearance of the ore being no criterion of its value.

These deposits occur along fissures or lines of shearing and crushing, and are often of great width and volume.

The values as smelted run from $10 to $30 per ton in Rossland camp, a yearly average being slightly over $15. In Boundary Creek camp the values are somewhat lower. Odd shipments from isolated districts have run as high as $100 a ton.

The following exhibits illustrate the above described class of ores :

Golden Crown Claim, Wellington Camp, Kettle River Mining Div., Yale District, B.C. } *Brandon and Golden Crown Mining Co., Grand Forks, B.C.*

486. Pyrrhotite and chalcopyrite.

621. " "

Wellington Camp, Grand Forks Mining Division, Yale District, B.C. } *Messss, McKenzie & Mann, Toronto, Ont.*

500. Magnetite with chalcopyrite.

Little Babe Claim, Wellington Camp, Grand Forks Mining Division, Yale District, B.C. } ....*Hugh McGuire.*

485. Chalcopyrite.

Monte Carlo Claim, Wellington Camp, Grand Forks Mining Division, Yale District, B.C. } ....*Hugh McGuire.*

476. Pyrite and pyrrhotite.

Lilly L. Claim, Wellington Camp, Grand Forks Mining Division, Yale District, B.C. } ....*Hugh McGuire.*

484. Pyrite.

Gold Drop Claim, Wellington Camp, Grand Forks Mining Division, Yale District, B.C. }

471. Chalcopyrite with pyrrhotite.

Winnipeg Claim, Wellington Camp, Grand Forks Mining Division, Yale District, B.C. } .... *Winnipeg Gold Mining Co.*

622. Pyrrhotite and chalcopyrite.

487. " "

Humming Bird Claim, Brown's Camp Grand Forks Mining Division Yale District, B.C. ...... *Smith Curtis, Rossland, B.C.*

466. Pyrrhotite,

Humming Bird Fraction Claim, Seattle Camp, Grand Forks Mining Division, Yale District, B.C. ......*N. Hardy, Grand Forks, B.C.*

478. Pyrrhotite.

Pathfinder Claim, Brown's Camp, Grand Forks Mining Division, Yale District, B.C. ....*Pathfinder Mining Co.*

597. Chalcopyrite and pyrrhotite.

Lexington Claim, White Camp, Grand Forks Mining Division, Yale District, B.C. ....*Lexington Gold Mining Co.*

615. Chalcopyrite and magnetite (2 specimens).

Lincoln Claim, White Camp, Grand Forks Mining Division, Yale District, B.C. ... *City of Paris Gold Mining Co.*

618. Chalcopyrite and hæmatite.

City of Paris Claim, White Camp, Grand Forks Mining Division, Yale District, B.C. ... *City of Paris Gold Mining Co.*

617. Galena with chalcopyrite, pyrite and blende.

The two claims, represented by Nos. 617 and 618, are adjoining and are being developed simultaneously. There are two leads called respectively the City of Paris and the Lincoln lead. The development work done so far consists of a tunnel in over 500 feet.

Toronto Chief Claim, Laforme Creek, Revelstoke Mining Division, West Kootenay, B.C. ....*John Leslie, Revelstoke, B.C.*

747. Arsenopyrite.

Silver Queen Claim, Snow Creek, Arrow Lake Mining Division, West Kootenay, B.C. ....*Silver Queen Mining Co.*

515. Pyrrhotite.

Hail Storm Group, Blue Grouse Mt., Arrow Lake Mining Division, West Kootenay, B.C. ....*Messrs. Jameson and Matthews.*

614. Argentiferous and auriferous quartz.

Promestora Claim, Burton City, Arrow Lake Mining Division, West Kootenay, B.C. ....*Messrs. Bourne, Demers* et al.

517. Pyrrhotite and pyrite, auriferous, also said to contain tellurium.

Red Mountain Claim, Silverton, Slocan Mining Division, West Kootenay, B.C.

458. Pyrrhotite.

Big Horn Group, Ymir, Nelson Mining Division, West Kootenay, B.C.

765. Quartzite with pyrrhotite.

Tennessee Claim, Ymir, Nelson Mining Division, West Kootenay, B.C. .... *Wm. Hennessy, Ymir, B.C.*

394. Pyrrhotite and pyrite.

Bullion Claim, Ymir, Nelson Mining Division, West Kootenay, B.C. *Alf Gold Mining Co., Rossland, B.C.*

395. Pyrrhotite.

Colonna Mine, Rossland, West Kootenay, B.C. *Monte Christo Gold Mining Co., Rossland, B.C.*

378. Chalcopyrite.

Virginia Mine, Rossland, West Kootenay, B.C. *Virginia Gold Mining Co., Rossland, B.C.*

383. Chalcopyrite.

The ore body is 25 feet wide. The work so far done on this property comprises a shaft of 400 feet and drifts to the amount of some 2000 feet.

Sovereign Claim, Rossland, West Kootenay, B.C. ....*John Ryan, Trail, B.C.*

425. Pyrrhotite and arsenopyrite.

Nest Egg Claim, Rossland, West Kootenay, B.C. } *Nest Egg Gold Mining Co., Victoria, B.C.*

413. Pyrrhotite and chalcopyrite in quartz.

Mascot Mine, Rossland, West Kootenay, B.C. } *Big Three Gold Mining Co., Toronto, Ont.*

386. Pyrrhotite, pyrite and chalcopyrite.

Homestake Mine, Rossland, West Kootenay, B.C. } *Homestake Mines Co., Ltd., Rossland, B.C.*

379. Pyrrhotite and chalcopyrite.

The area of this property is 21⅓ acres. A shaft has been sunk to 300 feet and some 1,100 feet of drifting done. The ledge has been followed by surface cuts for a distance of 700 feet.

Gopher Mine, Rossland, West Kootenay, B.C. } *Gopher Gold Mining Co., Rossland, B.C.*

376. Pyrrhotite,

Giant Claim, Rossland, West Kootenay, B.C. } *Giant Gold Mining Co., Spokane, Wash., U.S.*

419. Pyrrhotite and chalcopyrite.

Situated on the west flank of Red Mountain. Development work is being done on it. Two distinct leads have been recognized. A shipment of 114 tons is reported to have averaged $17 per ton.

R. E. Lee Claim, Rossland, West Kootenay, B.C. } *R. E. Lee Gold Mining Co., Rossland, B.C.*

418. Pyrrhotite and chalcopyrite.

The ore in the vein of this property is said to have yielded $38 to the ton. The work done on it so far consists of 100 feet of shaft and some 150 feet of tunnelling.

Coxey and Gertrude Claims, Rossland, West Kootenay, B.C. } *Montreal Gold Fields Co., Montreal, Que.*

416. Chalcopyrite and pyrrhotite.

Deer Park Mine, Rossland, West Kootenay, B.C. } *Deer Park Gold Mining Co., Toronto, Ont.*

375. Pyrrhotite.

Vertical shaft 305 feet deep and 300 feet of drifting. The shaft is in vein-matter the entire distance. There is a seven-drill compressor plant and an 80 horse-power boiler. The ore-body contains pay-streaks of rather high-grade ore, some being five feet at the widest part. In 1898 the mine had fifteen men working.

Evening Mine, Rossland, West Kootenay, B.C. } *Eureka Gold Mining Co., Rossland, B.C.*

381. Chalcopyrite.

Evening Star Mine, Rossland, West Kootenay, B.C. } *Evening Star Gold Mining Co., Spokane, Wash., U.S.*

382. Pyrrhotite.

The work on this property amounts to some 2,000 feet of tunnels, drifts, and shafts. The main work is on an ore-body about four feet wide and which averages $24 in gold.

Good Friday Mine, Rossland, West Kootenay, B.C. } *Good Friday Gold Mining Co., Spokane, Wash., U.S.*

387. Chalcopyrite.

I. X. L. Claim, Rossland, West Kootenay, B.C. } *I. X. L. Gold Mining Co., Spokane, Wash, U.S.*

414. Chalcopyrite and galena.

Iron Mask Mine, Rossland, West Kootenay, B.C. } *Iron Mask Gold Mining Co., Ltd., Spokane, Wash., U.S.*

593. Chalcopyrite and pyrrhotite.

This mine is situated on a claim, comprising 11 acres, adjoining the War Eagle mine. The average width of the vein is about six feet, and this is worked by two shafts and adequate tunnelling and drifting aggregating some 5,200 feet. For the year 1898 the shipments of ore amounted to 3,370 tons, which averaged nearly $22 per ton as per smelter returns, and in 1899 the shipments were increased to about 10,000 tons.

Le Roi Mine, Rossland, West Kootenay, B.C. } *Le Roi Mining Co., Ltd., London, Eng.*

595. Chalcopyrite with pyrrhotite.

This is one of the important mines of the province of British Columbia. The location was made in 1890, on a spur of Red Mountain, about half a mile west of the town of Rossland. The ore is the typical ore of the Trail Creek mining division, consisting of a mixture of auriferous pyrrhotite and chalcopyrite. The mine was for several years worked by the Le Roi Mining and Smelting Co., which put it on a dividend-paying

basis. The first shipment of ore was made in February, 1894, and amounted to 1,800 tons. The mine was acquired in 1898 by the British America Corporation, who for a time reduced the shipments to permit of more development work, which now is kept well ahead of extraction.

The mine is at present worked by an incline shaft 850 feet deep, divided into two hoisting compartments, with extensive tunnelling and drifting. The company possesses an excellent smelter plant at Northport, Washington State, capacity 450 tons a day. The shipments from this mine in 1898 amounted to 66,000 tons and for 1899 to 92,250 tons, the values of which vary from $12 to over $30 a ton.

Mayflower Mine, Rossland, West Kootenay, B.C. } *Mayflower Gold Mining Co., Spokane, Wash., U.S.*

388. Pyrite, galena and blende.

Monte Christo Mine, Rossland, West Kootenay, B.C. } *Monte Christo Gold Mining Co., Rossland. B.C.*

417. Pyrrhotite and chalcopyrite.

This mine is as yet in the development stage, although considerable work has been expended on it. Three hundred feet of shafts have been sunk and there are 4,750 feet of tunnelling and drifting. The plant comprises hoist, pumps, compressor, and boiler.

Nickel Plate Mine, Rossland, West Kootenay, B.C. } ....*Nickel Plate Gold Mining Co.*

586. Chalcopyrite and pyrrhotite.

The main work at this mine has been done on two veins, six to thirty inches wide, of chalcopyrite and pyrrhotite ore, assaying from $2 to $22 gold and 3 to 12 per cent. copper. Extensive drifting and cross-cutting has been done on it.

No. 1 Mine, Rossland, West Kootenay, B.C. } *West Le Roi Mining Co., Ltd., London, Eng.*

592. Chalcopyrite and pyrrhotite (two specimens).

Velvet Mine, Sophie Mountain, Rossland, B.C. } ......*Velvet Mines, Ltd., London, Eng.*

377. Chalcopyrite.

Victory Triumph Mine, Sophie Mountain, Rossland, West Kootenay, B.C. } *Victory Triumph Gold Mining Co., London, Eng.*

424. Chalcopyrite and malachite.

War Eagle Mine, Rossland, West Kootenay, B.C. } *War Eagle Consol. Gold Mining and Development Co., Toronto, Ont.*

555. Pyrrhotite and chalcopyrite.

This is one of the prominent mines of British Columbia and one of the three or four mines which have of late brought this province into prominence as a mining field. It is operated by the War Eagle Consolidated Mining and Development Co. The property was located in 1890, and after some extensive work was purchased in 1897 by the present syndicate. The surface and underground plants are modern and the mine is worked in a systematic and scientific way. The main shaft is down 850 feet, and there are several thousand feet of tunnels, drifts, levels, etc. The ore varies in value from $12 to $30 per ton. The greater part of the output of the mine is treated at the Trail smelter, which is operated by the Canadian Smelting Works. The shipments for the year 1898 amounted to 42,800 tons, valued at nearly $500,000, and in 1899 this was increased to 63,500 tons. This mine has paid large dividends.

White Bear Mine, Rossland, West Kootenay, B.C. } *White Bear Gold Mining Co., Toronto, Ont.*

385. Chalcopyrite and pyrrhotite.

This adjoins the Le Roi ground. The development work consists of some 600 feet of shafts and drifts.

Zilor Mine, Rossland, West Kootenay, B.C. } *Zilor Gold Mining Co., Rossland, B.C.*

415. Pyrrhotite and chalcopyrite.

Annie Mine, Rossland, West Kootenay, B.C. } *West Le Roi Mining Co., Ltd., London, Eng.*

590. Chalcopyrite and pyrrhotite.

Cliff Mine, Rossland, West Kootenay, B.C. } *Cliff Gold Mining Co., Rossland, B.C.*

420. Chalcopyrite.

Columbia-Kootenay Mine, Rossland, West Kootenay, B.C. } *Columbia-Kootenay Mining Co., Ltd., London, Eng.*

591. Pyrrhotite and chalcopyrite.

The vein of this mine varies in width from a few inches to over thirty feet of nearly solid pyrrhotite. It is worked by six tunnels, from 150 feet to over 1,200 feet long, most of them connected by raises and crosscuts. The work done on this property comprises some 5,000 feet.

Commander Mine, Rossland, West Kootenay, B.C. } *Commander Gold Mining Co., Rossland, B.C.*

384. Chalcopyrite.

Development work was begun on this property in 1898 and has been going on since. The total amount done is some 900 feet.

East St. Louis Mine, Rossland, West Kootenay, B.C. } *East St. Louis Gold Mining Co., Rossland, B.C.*

421. Pyrite.

The following exhibit illustrates the process followed at the Canadian Smelting Works treating the ores of the Rossland District.

The smelter was erected under the name of the British Columbia Smelting and Refining Works, the first furnace being fired up in February, 1896. In 1898 the plant was purchased by the Canadian Pacific Railway Co., which is now operating it. The works are located in the town of Trail.

The roasting of the ore was at first done in calcining furnaces, but is now done in heaps, with more satisfactory results. The roasted ore is then treated in large blast-furnaces, rectangular, water-jacketed with a capacity of some 200 tons, and the matte is afterwards refined so as to yield gold bullion.

Trail, B.C. .... } *Canadian Smelting Works, Trail, B.C.*

1029. Pyrrhotite and chalcopyrite (War Eagle mine).
1029*a*. " " " "
1029*b*. " " (Centre Star mine).
1029*c*. " " (Iron Mask mine).
1029*d*. " " " "
1029*e*. Flux limestone, Kootenay Lake.
1029*f*. Coke fuel, Crow's Nest Pass.
1029*g*. Coal, " " "
1029*h*. Roasted ores from roast heaps, 1st class.
1029*i*. " " " 2nd class.
1029*j*. Granulated matte.
1029*k*. " " calcined and briquetted.
1029*l*. Flue dust from flues.
1029*m*. " briquetted.
1029*n*. Slag brick used in flooring the works.
1029*o*. High grade matte, Au. $22.85, Ag. 39.2 oz., Cu. 68.3 per cent
1029*p*. Waste granulated slag.

Ores containing gold, silver and copper frequently with other accessory metals are largely represented throughout British Columbia, but such mixed ores do not constitute a strongly marked class.

They are commonly smelting ores, since each value can be recovered by such process, but so far their production is limited to a few mines. These ores appear to occur more frequently westward of the Kootenay country in Kamloops and Kettle River districts, and along the coast, as on Vancouver Island and Texada Island. The combined values often make a workable ore where the value of no single component is very high.

It must further be remarked that some of the ores enumerated below will no doubt eventually be worked as copper ores, etc. Many of the deposits have not been fully tested or opened up. It is thought best, however, to enumerate in connection with ores of gold these ores known or believed from their association to contain more or less considerable gold values.

The following exhibits illustrate the above described class of ores :

WWW Mine, Granite Creek, Alberni Mining Division, Vancouver Island, B.C. } *English-Canadian Development Co., Alberni, B.C.*

685. Pyrite and galena.

Thistle Group, Hiwatches Creek, Alberni Mining Division, Vancouver Island, B.C. } ....*A. Watson, Alberni, B.C.*

691. Chalcopyrite.

Indian Chief Claim, Sydney Inlet, West Coast of Vancouver Island, B.C. } *Messrs. Jones & Kincaid, Clayoquot, B.C.*

682. Chalcopyrite.

688. Bornite.

This is situated on Peacock Mountain. A tunnel some 250 feet has been driven, and several tons of bornite ore have been extracted.

Castle Group, Bear River, West Coast of Vancouver Island, B.C. } *Castle Mining Co., Clayoquot, B.C.*

704. Chalcopyrite and pyrite.

Jumbo Claim, Clayoquot, West Coast of Vancouver Island, B.C. } *Jumbo Mining Syndicate, Clayoquot, B.C.*

694. Chalcopyrite, surface ore.

694*a*. " 60 feet below surface.

Crow Claim, Deer Creek, Clayoquot, West Coast of Vancouver Island, B.C. — *Crow Mining Co., Clayoquot. B.C.*

684. Chalcopyrite.

686. Chalcopyrite and pyrrhotite.

This claim was among the first to be recorded in the division. About 200 tons of good copper ore, carrying gold, has been taken out.

Raven Claim, Texada Island, Nanaimo District, B.C. — *Van Anda Copper and Gold Co., Ltd., Vancouver, B.C.*

707. Magnetite with chalcopyrite.

Copper Queen Claim, Texada Island, Nanaimo District, B.C. — *Van Anda Copper and Gold Co., Ltd., Vancouver, B.C.*

511. Bornite and chalcopyrite.

505. " "

Cornell Claim, Texada Island, Nanaimo District, B.C. — *Van Anda Copper and Gold Co., Ltd., Vancouver, B.C.*

509. Bornite and chalcopyrite.

Texada Island, Nanaimo District, B.C. — *Van Anda Copper and Gold Co., Ltd., Vancouver, B.C.*

510. Furnace products (copper matte).

713. Smelted copper.

The Van Anda Copper and Gold Company owns a tract of land about 840 acres in area on the north side of Texada Island, including several mining claims. The ore bodies have scattered through them, in irregular masses, bornite and chalcopyrite, with certain values in silver and gold. A shipment of 500 tons of sorted ore, sent to Swansea, is reported to have given 10 to 15 per cent. copper, 7 ounces silver, and $7 gold to the ton. The property has been developed to a considerable extent and a fifty-ton smelter is in operation.

Prescott Claim, Texada Island, Nanaimo District, B.C. .... *Puget Sound Iron Co.*

711. Magnetite with chalcopyrite.

Red Deer Group, Texada Island, Nanaimo District, B.C. ....*F. W. McCready.*

708. Chalcopyrite.

Marble Bay Claim, Texada Island, Nanaimo District, B.C. .... *F. W. McCready.*

7 9. Bornite and chalcopyrite.

710. Chalcopyrite.

This is situated about a quarter of a mile to the north of the Van Anda mine shaft. The ore here is irregularly distributed through an igneous dyke and consists of copper-pyrites and iron-pyrites carrying gold values. A lot of 100 tons is said to have given an average assay of 8 per cent. copper, 12 oz. silver, and $25 in gold. The development work so far consists in a double compartment shaft, 100 feet deep, with drifts at the bottom.

Marble Bay Fraction No. 1 Claim, Texada Island, Nanaimo District, B.C. .... *F. W. McCready.*

712. Chalcopyrite, bornite and chalcocite.

Tyee Claim, Mount Sicker, Victoria Mining Division, Vancouver Island, B.C. *Tyee Mining Co.—C. Livingston, Duncans, B.C.*

508, Chalcopyrite.

Lenora Claim, Mount Sicker, Victoria Mining Division, Vancouver Island, B.C. ....*H Croft, Victoria, B.C.*

507. Chalcopyrite.

The ore on this claim is irregularly distributed through a greenish dyke, and samples have yielded assays of 5 to 10 per cent. copper, 5 to 10 oz. silver, and $5 to $10 gold. A tunnel has been driven with various cross-cuts. The outcroppings of the vein are very large.

Phair Claim, Gold Stream, Victoria Mining Division, Vancouver Island, B.C. ....*J. Phair, Victoria, B.C.*

690. Chalcopyrite.

King William Claim, Nicola, Kamloops Mining Division, Yale District, B.C. .... *Nicola Mining Co.*

653. Pyrite and galena.

Tubal Cain Claim, Nicola, Kamloops Mining Div., Yale District, B.C. .... *Nicola Mining Co.*

658. Galena.

Joshua Claim, Nicola, Kamloops Mining Div., Yale District, B.C. .... *Nicola Mining Co.*

655. Pyrite, galena and chalcopyrite.

Enterprise Claim, Nicola, Kamloops Mining Div., Yale District, B.C. .... *Mrs. Palmer.*

650. Pyrite and galena in quartz.

Manson Creek Mine, Kamloops Mining Div., Yale District, B.C. ....*G. MacDonald, Kamloops, B.C.*

720. Quartz carrying galena, tetrahedrite and chalcopyrite.

Big Copper Claim, Copper Camp, Kettle River Mining Division, Yale District, B.C. *Messrs. Austin, Hammer & McAuley, Greenwood, B.C.*

625. Cuprite and malachite.

Summit City Claim, Kettle River Mining Div., Yale District, B.C. *Star Mining and Exploration Co.*

547. Galena, chalcopyrite and pyrrhotite.

Bismarck Claim, Brown's Camp, Grand Forks Mining Division, Yale District, B.C. *Messrs. Ross & Matheson, Grand Forks, B.C.*

475. Chalcopyrite.

Silver Knot Claim, Brown's Camp, Grand Forks Mining Division, Yale District, B.C. .... *R. Clark, Grand Forks, B.C.*

465. Chalcopyrite.

Mother Lode Claim, Deadwood, Grand Forks Mining Division, Yale District, B.C. *B. C. Copper Co., Greenwood, B.C.*

631. Chalcopyrite.

Silver Queen Claim, Trout Lake Mining Div., West Kootenay, B.C. .... *J. Stanbor.*

537. Galena, pyrite and tetrahedrite.

Broad View Claim, Trout Lake Mining Div., West Kootenay, B.C. *Lillooet, Fraser River and Cariboo Gold Fields Co., Ltd.*

528. Chalcopyrite (auriferous).

True Blue Claim, Kaslo, Ainsworth Mining Div., West Kootenay, B.C. .... *W. P. Stevenson, Kaslo, B.C.*

455. Chalcopyrite.

This claim has undergone a good deal of development work. The ore runs high in copper and carries gold. The building of a tramway some two miles long, connecting the claim with Kootenay Lake, is under consideration.

Lily May Mine, Rossland, West Kootenay, B.C. *English-Canadian Gold Mining Co., London, Eng.*

380. Pyrite.

Mackenzie Claim, Russell Creek, Goat River Mining Division, West Kootenay, B.C.

571. Chalcopyrite.

Accident Claim, Duck Creek, Goat River Mining Division, West Kootenay, B.C. ...... *O. J. Wigen, Kuskinook, B.C.*

566. Tetrahedrite.

Copper Queen Claim, Duck Creek, Goat River Mining Division, West Kootenay, B.C. ....*A. Jefferson, Kuskinook, B.C.*

584. Chalcopyrite.

16 to 1 Claim, Duck Creek, Goat River Mining Division, West Kootenay, B.C. ....*O. J. Wigen, Kuskinook, B.C.*

562. Quartz with chalcopyrite.

Truly Rural Claim, Duck Creek, Goat River Mining Division, West Kootenay, B.C.

567. Tetrahedrite in quartz.

Blenheim Claim, Goat River Mining Division, West Kootenay, B.C. ....*Geo. Aleaxnder, Kalso, B.C.*

575. Galena and chalcopyrite.

Dumfrieshire Claim, Goat River Min. Division, West Kootenay, B.C. ....*W. P. Sloan, Nelson, B.C.*

578. Galena and chalcopyrite.

St. Andrew's Claim, Goat River Min. Division, West Kootenay, B.C. .... *W. Couch.*

561. Chalcopyrite and galena.

Black Prince Claim, Goat River Min. Division, West Kootenay, B.C. .....*G. Alexander and H. M. Forster.*

560. Galena and chalcopyrite.

Showdown Claim, Goat River Mining Division, West Kootenay, B.C.

557. Chalcopyrite.

Full Hand Claim, Goat River Mining Division, West Kootenay, B.C. .... *W. P. Sloan, Nelson, B.C.*

556. Chalcopyrite.

St. Patrick Claim, Goat River Mining Division, West Kootenay, B.C. .... *W. P. Sloan, Nelson, B.C.*

573. Chalcopyrite.

Capelton Claim, Goat River Mining Division, West Kootenay, B.C. .... *W. Couch.*

572. Chalcopyrite.

Josie Claim, Goat River Mining Div., West Kootenay, B.C. .... *John Fritsch.*

570. Chalcopyrite.

Patrick Claim, Goat River Mining Division, West Kootenay, B.C.

410. Chalcopyrite.

Homestake Claim, Goat River Mining Division, West Kootenay, B.C.

406. Chalcocite.

Porphyry and Iron Hill Claim, Canon Creek, Golden Mining Division, East Kootenay, B.C. *The Certainty Gold Mining Co., Golden, B.C.*

993. Chalcopyrite.

Paris Exhibition Group, Tracy Creek, Fort Steele Mining Division, East Kootenay, B.C. .... *Geo. Bushby, Victoria, B.C.*

785. Pyrrhotite and galena.

This location is situated some six miles up Six-mile Creek at an elevation of 6,200 feet, or 3,500 feet above the valley of the Kootenay. The country-rock is the limestone usually found in the Rockies at this elevation, and the veins are quartz carrying sulphides. Considerable work has been done on the property.

Estella Claim, Tracy Creek, Fort Steele Mining Division, East Kootenay, B.C. } *Messrs. Johnson and Robertson, Fort Steele, B.C.*

790. Tetrahedrite, galena and chalcopyrite.

This claim is at an elevation of 6,000 feet. The vein consists of quartz some four feet wide and has been traced about 2,000 feet on the hillside. The ore, as exposed by two development tunnels, consists of grey copper with carbonates and galena.

Some 300 feet above this vein outcrops an igneous dyke carrying galena. Only surface strippings have been made on this.

SILVER.*

The production of this metal in Canada at the present time is almost wholly to be credited to the province of British Columbia. Previous to the development, during the past few years, of the mines in this province, those operated in the Thunder Bay district of the Lake Superior region of Ontario constituted the only source of silver in Canada.

The veins last mentioned carry the metal in the native form and in the condition of argentite. Many of the deposits worked in British Columbia also owe their value to silver minerals proper; but by far the greater proportion of the ores worked and shipped consist of argentiferous galena. In the Slocan and some other districts of British Columbia these galenas

*The Precious Metals in British Columbia.—Gold and silver occur in British Columbia in a diversity of ways. Besides the gold extracted from the alluvial deposits all over the country, which were practically the only source of that metal for the first 35 years of production, the last few years have seen the opening up of a great many veins and other occurrences of auriferous and also of argentiferous minerals. In these, gold and silver either separately or together, are associated in a great variety of combinations with the baser metals. the ores presenting many different associations of metalliferous minerals. Any attempts to classify the specimens exhibited must therefore depend upon the relative economic importance of the different constituents of the ores. This gives classes which are, of course, more or less ill-defined, but which are roughly practical. For instance, the silver-copper ores will often carry also some gold, but would be generally considered under the heading of the metal having the preponderating value, and although in many instances the exhibits would apparently belong equally to several classes, they have been grouped with those to which they seemed most closely allied. Thus the classification of the exhibits adopted under the headings of Gold and Silver, whilst in many instances only roughly correct, are the nearest approximation possible under the circumstances.

run high in silver values, the ores of the first mentioned region averaging about 100 ounces. Besides these galenas there are many in this province in which the silver values are so low as to rank them rather as lead ores with a little silver. In this class, also, are practically all the galena ores occurring in the eastern provinces of Ontario, Quebec, New Brunswick and Nova Scotia, which, for this reason, are considered in the catalogue under the head of lead ores.

The other ores which may be properly considered as silver ores have been grouped under the following sub-divisions in so far as the information available enables this to be done :—

Silver Ores. (The silver values being due to silver minerals proper.)

Silver-lead Ores. (Galenas generally running high in silver values.)

Silver-copper Ores. (Copper sulphides with high silver values.)

Silver Ores.

Although these constitute only a small proportion of the ores mined, there are a number of veins known in some districts that owe their values to the presence of silver minerals proper, such as native silver, argentite, proustite and pyrargyrite, etc. In British Columbia a number of such veins are worked, yielding "dry ores," so called in contrast with the bulk of the ores mined which consist of galena.

In Ontario, of the numerous veins of this class that cut the horizontal cherts, shales and traps of the Animikie formation of Thunder Bay, two only are at present being worked. The existence of these silver veins has been known since 1866. Many of them have yielded rich ore in considerable quantities, but the fortunes of the district have been varied and the work done consequently irregular, periods of considerable activity alternating with periods of idleness.

The following exhibits illustrate this class of ores, although somewhat inadequately, being few in number. The exhibits of arquerite, consisting of silver and mercury, although not occurring in sufficient quantity, perhaps, to constitute an ore of the metal, are here placed on account of their mineralogical affinities.

Omineca Mining Division, Cariboo, B.C. .... *Geological Survey.*

1127. Model of arquerite nugget.

1128. Model of arquerite nugget.

1137. Small nuggets of arquerite.

Nuggets and grains of native silver or silver amalgam have been found in washing for gold in several parts of British Columbia, the largest being obtained in the Omineca gold district, on a branch of the Peace

River. A nugget from this district, analyzed by Messrs. Riotte & Leckhardt, of San Francisco, contained silver 83 30 per cent., mercury 11.00, lead 0.40, copper 0.20, as well as traces of gold, platinum and iron.—*Alluvion*.

Fisher Maiden Claim, Silverton, Slocan Mining Division, West Kootenay, B.C. } *W. H. Russell, Spokane, Wash., U.S.*

429. Quartz with silver sulphides.

Dolly Varden Claim, Carpenter Creek, Slocan Mining Division, West Kootenay, B.C. } ....*Martin Bros., Nelson, B.C.*

764. Tetrahedrite in quartz.

Evening Star Claim, Slocan Mining Division, West Kootenay, B.C. } .... *H. Sutherland, Slocan, B.C.*

443. Argentiferous pyrite in quartz.

ONTARIO.

Silver Mountain mine, Lybster Township, Thunder Bay District, Ont. } *Wiley Bros. and Herbert Shear, Port Arthur, Ont.*

166. Silver ore with calcite and quartz gangue.

166*a*. Argentite, in calcite with quartz gangue.

166*b*. Argentite, in calcite with fluorite and barite gangue.

166*c*. Argentite, in calcite gangue.

166*d*. Native silver and argentite with blende in a gangue of calcite and fluorite.

166*e*. Leaf native silver.

The richer portions of the ores, of which Nos. 166*c*, *d*, *e*, are specimens, are shipped directly to the smelter at Omaha, U. S. A., without milling, whilst the low-grade ore is crushed and concentrated at the mine previous to export Tke Silver Mountain vein cuts through the hill of that name, with a general direction a little to the north of east. It is a persistent fissure vein, showing at frequent intervals across the hill for a distance of over a mile. The enclosing rock is argillite, surmounted, as is usual in this district, by a sheet of columnar basic trap, and underlain by the cherty basal beds of the series. Along its outcrop in the trap-sheet the vein is large and solid, from four to six feet thick. It consists of calcite, barite and quartz with fluorite.

This mine was discovered in 1884. The property was then dealt with in separate halves known as the East and West ends respectively. A great deal of development work has been done on both properties.

Rabbit Mountain Mine, Scoble Township, Thunder Bay District, Ont. } *The Dominion Gold Mining and Reduction Co., London, Eng.*

168. Calcite with pyrite, galena and silver.

168*a*. Argentite and pyrite in calcite and brecciated country-rock.

168*b*. Leaf argentite in country-rock.

The vein here is from four to six feet in width and even much more in places. The strike is N. 35° to 43° E. and dips N.W. 65° to 70°. It consists of a number of branches and stringers interlaced; the ore being native silver and argentite, accompanied by blende with a little iron-pyrites in a gangue of quartz, calcite and fluorite. The location was discovered in 1882, and since then development work has been prosecuted at intervals. Since 1893, the mine has been closed down. A stamp mill with a capacity of fifteen tons per day was erected near the mine for the purpose of concentrating the low grade ore by Frue vannes. The manager of the mine in 1886 stated that the milling ore at that time averaged $80 a ton in silver value.

Porcupine Mine, Gillies Township, Thunder Bay District, Ont. } *Wiley Bros. and Herbert Shear, Port Arthur, Ont.*

167. Leaf argentite in country-rock.

167*a*. Argentite.

167*b*. Calcite and fluorite containing blende and rich in silver.

167*c*. Argentite in calcite and quartz.

167*d*. Leaf argentite in calcite.

The vein has a thickness of from two to five feet. Its contents are similar to those usually found in this district, being a gangue of quartz and calcite with some barite and fluorite containing native silver and argentite. The enclosing rocks are horizontal, black argillite, capped with trap underlain by cherty and jaspery beds, the whole resting on the Archæan. Work was begun in 1884. It has been of a development nature rather than exploitation, the intention of the owners being to prove the mine. The ore taken out, however, is stated to have more than covered the expense incurred in the course of the development. Work has been suspended for several years.

Silver-lead Ores.

British Columbia.

Of the silver-lead ore class, the most typical are those of the Slocan, where numerous mines are working, yielding galena which, in the shipments of the whole district for the year, has averaged about 100 ounces

of silver to the ton. The ores occur in fissure veins mostly, although in segregated bodies at places, in a series of shales, argillites, etc., cut by intrusive masses and dykes of porphyry and other igneous rocks. In the case of some of the deposits zinc blende also occurs in considerable proportion.

Whilst the Slocan may, because of its development, be taken as the typical silver-lead ore district of British Columbia, similar ores are very widely distributed throughout the province, notably in the Ainsworth, Lardeau, Trout Lake, Revelstoke, Illicillewaet and Goat River divisions of West Kootenay district, and in the Golden, Windemere, and Fort Steele divisions of East Kootenay district. Ores of the same class are also known to exist in many places in the north of British Columbia, where they have not yet been opened up or worked.

Besides the galena deposits proper, this mineral is also found in the deposits of mixed ore already described as gold-silver-copper ores and in the class of silver-copper ore deposits dealt with hereafter.

The character of the deposits in the different districts varies somewhat, of course. The Lardeau and Trout Lake ores, for instance, carry quite an appreciable amount of gold. In some cases the richer silver minerals, such as jamesonite, proustite, pyrargyrite, argentite and native silver are also found in deposits where the bulk of the ore is galena and where the exhibit is, therefore, classed with the silver-lead ores.

Whilst there are numerous known deposits of galena in the eastern provinces of Canada, their silver content as a whole is much lower than in those of British Columbia, and they are, therefore, considered under the heading of lead ores.

Tangier Claim, Downie Creek, Revelstoke Mining Division, West Kootenay, B.C. .... *Tangier Mine, Ltd.*

748. Galena.

Lanark Claim, Illicillewaet Mining Division, West Kootenay, B.C. .... *Geological Survey.*

1171. Galena.

This mine is situated one and a half miles north of the station of Laurie on the C.P.R. The mine is connected with the mill by an Otto wire-rope tramway, operated by power obtained from the Illicillewaet River. The ore consists of argentiferous galena accompanied by iron-pyrites in a quartz and calcite gangue. Work is at present suspended.

Elizabeth Claim, Fish Creek, Lardeau Mining Division, West Kootenay, B.C. .... *Geological Survey.*

1180. Galena.

Brunswick Claim, Fish Creek, Lardeau Mining Division, West Kootenay, B.C. ....*J. A. Magee, Comaplix, B.C.*

743. Galena.

Prince Edward Claim, Boyd Creek, Lardeau Mining Division, West Kootenay, B.C. ....*C. E. Woods, Okanagan, B.C.*

742. Galena.

Lone Star Claim, Lexington Creek, Lardeau Mining Division, West Kootenay, B.C. ......*Thos. T. Dunn, Comaplix, B.C.*

740. Galena.

Mountain Boy Claim, Mohawk Creek Lardeau Mining Division, West Kootenay, B.C. ..... *W. G. Girard, Comaplix, B.C.*

741. Galena.

Nettie L. Claim, Trout Lake Mining Division, West Kootenay, B.C. *Great Western Co., Revelstoke, B.C.*

534. Galena, magnetite and pyrite.

St. Elmo Claim, Trout Lake Mining Division, West Kootenay, B.C. ....*Hugh McPherson.*

529. Galena, pyrite aud tetrahedrite.

Mogul Claim, Trout Lake Mining Division, West Kootenay, B.C. .... *Messrs. Jacobson & Olson.*

539. Galena.

Great Northern Claim, Trout Lake Mining Division, West Kootenay, B.C. *Lillooet, Fraser River and Cariboo Gold Fields Co.*

524. Galena and tetrahedrite.

Sunshine Claim, Trout Lake Mining Division, West Kootenay, B.C. *Sunshine Co., Ltd., Revelstoke St'n, B.C.*

540. Galena and tetrahedrite.

Silver Cup Claim, Trout Lake Mining Division, West Kootenay, B.C. *Sunshine Co., Ltd., Revelstoke St'n, B.C.*

527. Galena and tetrahedrite.

A good deal of development work is being done on this claim, measuring in all some 2000 feet of tunnels and drifts, and a shaft 185 feet deep.

Mabel and Virginia Claim, Trout Lake Mining Division, West Kootenay, B. C. } *Messrs. E. M. Morgan* et al., *Trout Lake, B.C.*

532 Galena.

American Claim, Trout Lake Mining Division, West Kootenay, B. C. } *Thos. Taylor, Trout Lake, B.C.*

535 Galena.

This claim is situated at the head of Haskin Creek, four miles from Trout Lake. Some 60 feet of drifting work has shown a lead of 14 inches of galena.

Catford Claim, Trout Lake Mining Division, West Kootenay, B.C. } *Messrs. F. B. Wells* et al., *Revelstoke, B.C.*

530. Galena.

Silver Belt Claim, Trout Lake Mining Division, West Kootenay, B.C. } ....*Silver Belt Syndicate.*

525. Galena.

Little Robert Claim, Trout Lake Mining Division, West Kootenay, B.C. } *Messrs. J. C. Kirkpatrick* et al., *Trout Lake, B.C.*

536. Galena.

Bad Shot Claim, Trout Lake Mining Division, West Kootenay, B.C. } *Messrs. F. Campbell* et al., *Trout Lake, B.C.*

533. Galena.

On this property an incline shaft has been sunk to a depth of 80 feet, Drifts have been driven from the bottom of the shaft on the ore-body. It is reported to show 6 inches of clear ore.

Black Diamond Claim, Trout Lake Mining Division, West Kootenay, B.C. } *Messrs. Bailey* et al., *Trout Lake, B.C.*

523. Galena and pyrite.

523*a*. Galena and chalcopyrite.

Pedro Claim, Trout Lake Mining Division, West Kootenay, B.C. } ....*A. Sandon, Trout Lake, B.C.*

531. Cupriferous quartz with galena.

John L. Claim, Trout Lake Mining Division, West Kootenay, B.C. } *Messrs. J. G. Lynch* et al., *Trout Lake, B.C.*

526. Galena.

Ethel Mine, Trout Lake Mining Division, West Kootenay, B.C. } *Messrs. T. M. Bird* et al., *Trout Lake, B.C.*

543. Quartz with tetrahedrite, galena, malachite, azurite and decomposed galena.

Kincardine Claim, Silver Mt. Arrow Lake Mining Division, West Kootenay, B.C. } *Messrs. Watt, Christy* et al., *Burton City, B.C.*

516. Galena.

Mountain Chief Claim, New Denver, Slocan Mining Division, West Kootenay, B.C. } *Messrs. G. W. Hughes* et al., *Three Forks, B.C.*

502. Galena.

714. Galena.

Hustler Fraction Claim, Three Forks, Slocan Mining Division, West Kootenay, B.C. } *Ernest Harrop, Three Forks, B.C.*

717. Galena.

Monitor Claim, Three Forks, Slocan Mining Division, West Kootenay, B.C. } *Ernest Harrop, Three Forks, B.C.*

428. Galena.

Emily Edith Claim, Silverton, Slocan Mining Division, West Kootenay, B.C. } *Messrs. Hope, Graveley & Co., Vancouver, B.C.*

444. Galena.

Vancouver Claim, Silverton, Slocan Mining Division, West Kootenay, B.C. } *Vancouver Mining and Milling Co., Vancouver, B.C.*

456. Galena.

This is situated about 6 miles from Silverton. The development is being pushed actively. A shipment of 300 tons was reported for the year 1898.

Wakefield Claim, Silverton, Slocan Mining Division, West Kootenay, B.C. ....*D. Bremmer, Silverton, B.C.*

459. Galena.

Noonday Claim, Silverton, Slocan Mining Division, West Kootenay, B.C. ....*H. J. Stewart, Silverton, B.C.*

457. Galena with native silver.

Payne Mine, Sandon, Slocan Mining Division, West Kootenay, B.C. *Payne Mining Co., Sandon, B.C.*

503. Galena.

This mine is situated on Payne Mountain, four miles from Sandon. The first drift, over three hundred feet long, was run in ore almost continuously. The vein has a quartz gangue, but in places it has a maximum width of solid high-grade galena of three feet. At present it is worked by means of five drifts. The ore consists of galena and "carbonates." The "carbonates" are reported to assay 80 to 100 oz. of silver per ton and 35 to 40 per cent. of lead, while the galena contains 175 oz. of silver and 70 per cent. of lead. The cost of mining is low. The ore is transported to the railway by a three-rail gravity tramway 6000 feet long. In 1898 the mine is reported to have shipped 14,000 tons.

Ruth Mine, Sandon, Slocan Mining Division, West Kootenay, B.C. ....*Geo. Alexander, Kaslo, B.C.*

496. Galena.

This mine is situated near Sandon. The ore consists of galena and "carbonates." It is worked by six drifts with an aggregate length of 3200 feet and about 2500 feet of upraises, winzes, etc. In 1898 shipments from the mine are reported to have been 3250 tons.

Last Chance Claim, Slocan Mining Division, West Kootenay, B.C. *Last Chance Mining Co., Sandon, B.C.*

427. Galena.

The ore here consists of galena and "carbonates." It is reported that important ore-bodies are being developed. The mine is worked by four drifts. The surface plant includes an aerial tramway. The shipments for 1898 amounted to 1700 tons.

Ajax Claim, Sandon, Slocan Mining Division, West Kootenay, B.C. .... *A. W. Wright, Sandon, B.C.*

603. Galena.

On this claim some 1500 feet of drifting has been done as development work. The ore is a galena mixed with blende.

Palmetto Claim, Sandon, Slocan Mining Division, West Kootenay, B.C. ....*B. C. Department of Mines.*

602. Galena.

Ocean Claim, Sandon, Slocan Mining Division, West Kootenay, B.C. ....*B. C. Department of Mines.*

481. Galena.

Best Mine, Sandon, Slocan Mining Division, West Kootenay, B.C. *Messrs. G. W. Hughes* et al., *Three Forks, B.C.*

589. Galena.

Noble Five Mine, Cody, Slocan Mining Division, West Kootenay, B.C. *Noble Five Mining Co., Victoria, B.C.*

495. Galena.

716. Galena.

Considerable shipments have been made from this mine. At present further development work is being prosecuted. It is worked by nine drifts, at a height of about 2500 to 3000 feet above the adjacent valley, where a concentrating plant is installed. This is connected with the mine by an aerial tramway.

Trade Dollar Claim, Cody, Slocan Mining Division, West Kootenay, B.C. ....*J. A. Whittier, Kaslo, B.C.*

446. Galena.

Goodenough Claim. Cody, Slocan Mining Div., West Kootenay, B.C. ....*J. A. Whittier, Kaslo, B.C.*

501. Galena.

Dardanelles Claim, Slocan Mining Division, West Kootenay, B.C. *Sir C. Hibbert Tupper, Vancouver, B.C.*

518. Galena.

Reported to show 2 feet of ore at a depth of 500 feet.

Rambler-Cariboo Claim, Slocan Mining Division, West Kootenay, B.C. .... *W. H. Adams, Kaslo, B.C.*

604. Galena.

Castic Claim, Slocan Mining Division, West Kootenay, B.C. ....*B. C. Department of Mines.*

482. Galena.

Queen Bess Mine, Slocan Mining Division, West Kootenay, B.C. ....*Duncan Mines, Nelson, B.C.*

436. Galena.

Situated about four miles from Three Forks. The ore is galena and "carbonates." The mine is worked by three drifts and over 5000 running feet of work has been done. The shipments for 1898 amounted to 1700 tons.

Stephenson Claim, Slocan Mining Division, West Kootenay, B.C. ....*Geological Survey.*

1176. Galena.

Slocan Boy Claim, Slocan Mining Division, West Kootenay, B.C. ....*Geological Survey.*

1175. Galena.

Great Western Claim, Slocan Mining Division, West Kootenay, B.C. .... *Geological Survey.*

1173. Galena.

Alamo Claim, Slocan Mining Division, West Kootenay, B.C. .... *Geological Survey.*

1164. Galena.

Two Friends Claim, Springer Creek, Slocan City Mining Division, West Kootenay, B.C. ......*C. C. Bennett, Vancouver, B.C.*

445. Galena.

Gertrude Claim, Duncan River, Ainsworth Mining Division, West Kootenay, B.C. .... *Gold Hill, Ltd., Toronto, Ont.*

448. Galena.

480. Galena.

President Group, Duncan River, Ainsworth Mining Division, West Kootenay, B.C.	.... *W. A. Jowett, Nelson, B.C.*

409. Galena.

Gertie Claim, Duncan River, Ainsworth Mining Division, West Kootenay, B.C.	............*B. C. Department of Mines.*

519. Galena.

Lavina Claim, Hamill Creek, Ainsworth Mining Division, West Kootenay, B.C.	*A. W. Crookstone, Glasgow, Scotland.*

422. Galena.

Otto's Midget Claim, Hamill Creek, Ainsworth Mining Division, West Kootenay, B.C.	............*B. C. Department of Mines.*

544. Galena.

Sunset Claim, Whitewater, Ainsworth Mining Division, West Kootenay, B.C.	................*John Elliott, Nelson, B.C.*

504. Galena.

Whitewater Mine, Whitewater, Ainsworth Mining Division, West Kootenay, B.C.	*Whitewater Mines, Ltd., Kaslo, B. C.*

479. Galena.

This claim was located in 1891 by J. C. Eaton, and it has been worked continuously since 1894. It is exploited systematically, the development work being kept ahead of winning, and so far it has proved the best paying mine of the division. The ore is high-grade argentiferous galena. A concentrator with a capacity of 120 tons a day has been erected.

Whitewater Deep Claim, Ainsworth Mining Division, West Kootenay, B. C.	*Whitewater Deep Co., Whitewater, B.C.*

600. Galena.

This mine is situated on what is thought to be the continuation of the Whitewater lode ; it has been purchased by the Whitewater Deep Co., which also controls several other claims. Development work is in active progress.

Lucky Jim Claim, Bear Lake, Ainsworth Mining Division, West Kootenay, B.C. .... *E. J. Matthews, Nelson, B.C.*

497. Blende.

498. Galena.

Stranger Claim, Jackson Basin, Ainsworth Mining Division, West Kootenay, B.C. .... *J. A. Whittier, Kaslo, B.C.*

494. Galena.

Washington Claim, Jackson Basin, Ainsworth Mining Division, West Kootenay, B.C. .... *O. J. Stone, Kaslo, B. C.*

588. Galena.

Jackson Mines Group, Jackson Basin, Ainsworth Mining Division, West Kootenay, B.C. *Jackson Mines, Ltd, Whitewater, B.C.*

493. Galena.

520. Galena.

Antoine Claim, McGuigan's Basin, Ainsworth Mining Division, West Kootenay, B.C. *Jackson Mines, Ltd, Whitewater, B.C.*

463. Galena.

Montezuma Claim, Ainsworth Mining Division, West Kootenay, B.C. .... *O. J. Stone, Kaslo, B.C.*

521. Galena and blende.

This is one of the claims first located in the district. The ore is a fine "steel" galena. The mine has made some shipments, but at present development work only is going on. A 150-ton concentrator has been erected.

Silver Bell Claim, Ainsworth Mining Division, West Kootenay, B.C. .... *R. F. Green, Kaslo, B.C.*

522. Galena and native silver.

B. N. A. Claim, Ainsworth Mining Division, West Kootenay, B.C. .... *R. F. Green, Kaslo, B.C.*

601. Galena.

Woodbury Creek, Ainsworth Mining Division, West Kootenay, B.C. } *C. P. Mining and Milling Co. of Minneapolis, Minn.*

452. Galena.

Little Mamie Claim. Ainsworth Mining Division, West Kootenay, B.C. } ...*T. J. Lendrum, Ainsworth, B.C.*

449. Galena.

United Claim, Ainsworth Mining Division, West Kootenay, B.C. } *A. W. McCune, Salt Lake City, Utah, U.S.*

460. Galena.

Tariff Claim, Ainsworth Mining Division, West Kootenay, B.C. } ......*D. W. Clark, Ainsworth, B.C.*

461. Galena.

Highland Claim, Ainsworth Mining Division, West Kootenay, B.C. } ......*M. Stevenson, Ainsworth, B.C.*

450. Galena.

Highlander Claim, Ainsworth Mining Division, West Kootenay, B.C. } ......*M. Stevenson, Ainsworth, B.C.*

451. Galena.

Little Phil Claim, Ainsworth Mining Division, West Kootenay, B.C. } ...... *J. F. Stevens, St. Paul, Minn.*

447. Galena.

Maggie Claim, Ainsworth Mining Division, West Kootenay, B.C. } ....*B. C. Department of Mines.*

492. Galena.

Josephine Claim, Ainsworth Mining Division, West Kootenay, B.C. } *Josephine Mining Co., Ainsworth, B.C.*

491. Galena.

Blue Bell Claim, Ainsworth Mining Division, West Kootenay, B.C. } *Campbell Sweeney, Vancouver, B.C.*

462. Galena.

The Blue Bell was the first mining camp in West Kootenay, the Blue Bell claim having been located in 1883. Although the deposit was

known many years earlier, it was considered as then too remote to be of any value. There is an extremely large body of galena ore, often containing blende, but not very high in silver-content. The mine is situated on the east shore of Kootenay Lake.

Silver Hill Claim, Ainsworth Mining Division, West Kootenay, B.C. } *London Con. Gold Fields, Rossland, B.C.*

423. Galena.

Humboldt Claim, Ainsworth Mining Division, West Kootenay, B.C. } *Messrs. McLaren* et al., *Nelson, B.C.*

441. Galena.

Tam O'Shanter Claim, Ainsworth Mining Division, West Kootenay, B.C. } ....*A. B. Irwin, Rossland, B.C.*

490. Galena.

Star Claim, Ainsworth Mining Division, West Kootenay, B.C. } ...*W. P. Hatch, Los Angeles, Cal.*

454. Blende.

Old Timer Claim, Ainsworth Mining Division, West Kootenay, B.C. } .... *Geological Survey.*

1172. Galena.

Nevada Claim, Ymir, Nelson Mining Division, West Kootenay, B.C. } ....*J. W. Masterson.*

397. Galena.

Legal Tender Claim, Salmo, Nelson Mining Division, West Kootenay, B.C. } ....*J. P. Sholtz, Nelson, B.C.*

402. Galena and blende.

Silver Dollar Claim, Salmo, Nelson Mining Division, West Kootenay, B.C. } ....*W. Watson, Nelson, B.C.*

405. Galena

Lizard Claim, Duck Creek, Goat River Mining Division, West Kootenay, B.C. } ....*B. C. Department of Mines.*

721. Galena.

Selkirk Claim, Duck Creek, Goat River Mining Div., West Kootenay, B.C ....*O. J. Wigen, Kuskinook, B.C.*

569. Galena.

St. George Claim, Goat River Mining Division, West Kootenay, B.C. .... *W. P. Sloan, Nelson, B.C.*

583. Galena and pyrite.

Jennie Claim, Goat River Mining Division, West Kootenay, B.C. ....*W. P. Sloan, Nelson, B.C.*

580. Galena.

Alice Claim, Goat River Mining Division, West Kootenay, B.C. ....*Geo. Alexander, Kaslo, B.C.*

579. Galena.

Kaffir Claim, Goat River Mining Division, West Kootenay, B.C. ....*W. Ledingham, Nelson, B.C.*

582. Galena.

Iris Claim, Goat River Mining Div., West Kootenay, B.C. ....*J. Ledingham, Victoria, B.C.*

576. Galena.

Wabash Claim, Goat River Mining Division, West Kootenay, B.C. *G. A. M. Young, Kuskinook, B.C.*

577. Galena.

Morning Star Claim, Goat River Mining Division, West Kootenay, B.C. *Messrs. Richard Wood and R. Hall.*

559. Galena.

Challenger Claim, McMurdo Creek, Golden Mining Division, East Kootenay, B.C. ....*H. Richardson, Golden, B.C.*

967. Galena.

Crown Point Claim, McMurdo Creek, Golden Mining Division, East Kootenay, B.C. *Kootenay Consol. Mining Co., Everett, Wash., U.S.*

969. Galena.

Ruth Claim, Vermont Creek, Golden Mining Division, East Kootenay, B.C. ..... *F. P. Armstrong, Golden, B.C.*

952. Galena and pyrite.

Agnes Claim, Vermont Creek, Golden Mining Division, East Kootenay, B.C. *Messrs. Alexander and Jackson, Kaslo, B.C.*

992. Galena.

Wells and Pollock Claims, Vermont Creek, Golden Mining Division, East Kootenay, B.C. .... *Geological Survey.*

1165. Galena.

Black Horse Claim, Vermont Creek, Golden Mining Division, East Kootenay, B.C. ....*M. Dainard, Golden, B.C.*

990. Jamesonite and galena.

Minnie Claim, Vermont C'k, Golden Mining Division, East Kootenay, B.C. ....*M. Carlin, Golden, B.C.*

949. Galena.

Charlotte Claim, Vermont Creek, Golden Mining Division, East Kootenay, B.C. .... *F. H. Bacon, Golden, B.C.*

951. Galena.

Whistler Claim, Spillimachene Middle Fork, Golden Mining Div., East Kootenay, B.C. .... *Wm. McNeish & Co.*

959. Galena.

Ellen D. Claim, Spillimachene Middle Fork, Golden Mining Div., East Kootenay, B.C. *Messrs. Joliffe and Keyser, Golden, B.C.*

971. Tetrahedrite and galena.

Standby and Maud S. Claim, Spillimachene Middle Fork, Golden Mining Div., East Kootenay, B.C. *Messrs. Stacey and Joliffe, Golden, B.C.*

955. Galena and tetrahedrite.

Boston Claim, Spillimachene Middle Fork, Golden Mining Division, East Kootenay, B.C. } *Kootenay Consolidated Mining Co., Everett, Wash., U.S.*

963. Tetrahedrite and galena.

Rothschild Claim, Spillimachene Middle Fork, Golden Mining Division, East Kootenay, B.C. } ......*Stephen Redgrave, Golden, B.C.*

972. Galena.

Hidden Treasure Claim, Spillimachene Mt., Golden Mining Div., East Kootenay, B.C. } ....*H. Croft, Victoria, B.C.*

998. Galena.

Giant Claim, Spillimachene Mountain, Golden Mining Div., East Kootenay, B.C. } ...... *W. J. R. Cowell, Victoria, B.C.*

982. Galena.

No. 2 Claim, Bugaboo Creek, Golden Mining Division, East Kootenay, B.C. } *Golden and Fort Steele Development Co., Golden, B.C.*

924. Galena.

Monarch Claim, Mount Stephen, Golden Mining Division, East Kootenay, B.C. } ....*George de Wolf, Vancouver, B.C.*

981. Galena.

Monarch Extension Claim, Mount Stephen, Golden Mining Division, East Kootenay, B.C. } ....*H. Vaughan, Vancouver, B.C.*

994. Galena.

Timbasket Claim, Timbasket Lake, Golden Mining Division, East Kootenay, B.C. } *Golden and Fort Steele Development Co., Golden, B.C.*

964. Galena.

Anglo-Saxon Claim, No. 2 Creek, Windermere Mining Div., East Kootenay, B.C. } ....*C. A. Watt, Windermere, B.C.*

933. Galena.

Delphine Claim, Toby Creek, Windermere Mining Division, East Kootenay, B.C. } *Messrs. Stark and Kimpton, Windermere, B.C.*

937. Galena.

939. Tetrahedrite.

Hot Punch Claim, Toby Creek, Windermere Mining Division, East Kootenay, B.C. } *Messrs. Collect, Stoddard and Abell, Windermere, B.C.*

934. Galena.

K.C. Claim, Toby Creek, Windermere Mining Div., East Kootenay, B.C. } *Messrs. Frazer and Power, Windermere, B.C.*

935. Galena.

Leadwell Claim, Toby Creek, Windermere Mining Division, East Kootenay, B.C. } *Messrs. Hurst and Legg, Windermere, B.C.*

923. Galena, blende and pyrite.

Lalee Claim, Toby Creek, Windermere Mining Div., East Kootenay, B.C. } *Messrs. Hurst and Legg, Windermere, B.C.*

922. Galena and chalcopyrite.

Washburn Claim, Toby Creek, Windermere Mining Division, East Kootenay, B.C. } ....*S. Wilson, Windermere, B.C.*

940. Galena.

Bullion Claim, Toby Creek, Windermere Mining Div., East Kootenay, B.C. } ......*W. B. Abell, Windermere, B.C.*

929. Galena.

Black Diamond Claim, Toby Creek, Windermere Mining Div., East Kootenay, B.C. } *Messrs. Watt and Lake, Windermere, B.C.*

931. Galena.

Silver Pass Claim, Law Creek, Windermere Mining Division, East Kootenay, B.C. } *Messrs. Frazer and Power, Windermere, B.C.*

936. Galena.

Silver Thread Claim, Law Creek, Windermere Mining Div., East Kootenay, B.C. } *Silver Thread Mining Co., Windermere, B.C.*

928. Galena.

Golden Eagle Claim, Law Creek, Windermere Mining Div., East Kootenay, B.C. } ....*J. A. Scott, Windermere, B.C.*

938. Galena.

Sitting Bull Group, Boulder Creek, Windermere Mining Div., East Kootenay, B.C. } ...*B. Morrigeau, Windermere, B.C.*

984. Galena.

Caretaker Claim, Boulder Creek, Windermere Mining Div., East Kootenay, B.C. } ......*Jas. McLeod, Windermere, B.C.*

927. Galena.

Bryan Claim, Copper Creek, Windermere Mining Div., East Kootenay, B.C. } ....*F. Hammann.*

799. Tetrahedrite and galena.

North Star Claim, Mark Creek, Fort Steele Mining Division, East Kootenay, B.C. } *North Star Mining Co., Fort Steele, B.C.*

789. Galena.

This mine is on a lode on which there are several claims controlled by the same company. The lode was located in 1892 by Jos. Bourgeois, the locator of the War Eagle, Centre Star and other claims. It is situated on a gentle slope one mile south of Mark Creek. The ore is clean solid argentiferous galena, fine-grained, with a small amount of zinc-blende, the assays varying from 20 to 60 ounces of silver and 45 to 68 per cent. lead. Shipments of some three thousand tons have given an average yield of 30 ounces silver per ton and 55 per cent. lead. A branch from the Crow's Nest Pass line of the Canadian Pacific Railway has been built to the vicinity of the mine.

Sullivan Group, Mark Creek, Fort Steele Mining Division, East Kootenay, B.C. } *Sullivan Mining Co., Fort Steele, B.C.*

773. Galena.

Hope Claim, Mark Creek, Fort Steele Mining Division, East Kootenay, B.C. .... *J. Houghton, Fort Steele, B.C.*

779. Galena.

Black Bear Claim, Mark Creek, Fort Steele Mining Division, East Kootenay, B.C. .... *C. Estmere, Kimberly, B.C.*

1018. Galena and pyrite.

Lottie Claim, Luke Creek, Fort Steele Mining Division, East Kootenay, B.C. .... *M. Caldwell, Fort Steele, B.C.*

1019. Galena.

Bill Nye Claim, Tracy Creek, Fort Steele Mining Division, East Kootenay, B.C. .... *Wm. Violet, Fort Steele, B.C.*

774. Galena.

Ram's Horn Claim, Tracy Creek, Fort Steele Mining Division, East Kootenay, B C. .... *A. B. Grace, Fort Steele, B.C.*

781. Galena.

Minnie M. and Tiger Claim, Tracy Creek, Fort Steele Mining Div., East Kootenay, B.C. *Fort Steele Development Co., Fort Steele, B.C.*

1021. Galena.

Colonel Henderson Claim, Six Mile Creek, Fort Steele Mining Div., East Kootenay, B.C. *R. O. Jennings, Fort Steele, B.C.*

780. Galena.

Ivanhoe Claim, Wild Horse Creek, Fort Steele Mining Division, East Kootenay, B.C. .... *W. W. Violet, Fort Steele, B.C.*

1022. Galena.

Kootenay Chief Claim, Wild Horse Creek, Fort Steele Mining Div., East Kootenay, B.C. .... *Geological Survey.*

1174. Galena.

Lake Shore Claim, Moyie Lake, Fort Steele Mining Division, East Kootenay, B.C. ... *Canadian Gold Fields, Moyie City, B.C.*

553. Galena.

Moyie and Queen of Hills Claim, Moyie Lake, Fort Steele Mining Division, East Kootenay, B.C. ... *Canadian Gold Fields, Moyie City, B.C.*

554. Galena.

St. Eugene Claim, Moyie Lake, Fort Steele Mining Division, East Kootenay, B.C. ... *Messrs. Gooderham and Blackstock, Toronto, Ont.*

1020. Galena and blende.

The ore is stated to assay 70 per cent. lead and some 50 oz. of silver to the ton. Two shafts have been sunk and two drifts driven.

Society Girl Claim, Moyie Lake, Fort Steele Mining Division, East Kootenay, B.C. ....*C. Farrel, Moyie City, B.C.*

1024. Galena.

Silver-Copper Ores.

The following exhibits are illustrative of the class of silver-copper ores, previously mentioned.

The pyritous ores mined near Capelton, Quebec, carry a few ounces of silver per ton, but these, being primarily mined as sulphur ores for use in acid-making, have been described under that heading, and the ores exhibited are therefore confined to British Columbia. In this province there are many other deposits in which silver occurs with gold, copper and lead minerals and other constituents, but these are to be found under the class of gold-silver-copper ores already described, and the following list of exhibits are illustrative of a distinct group of copper ores valuable especially on account of their silver contents.

In the group under consideration the ores consist chiefly of the sulphides of copper, chalcopyrite, bornite, etc., with which is associated a little galena.

These ores are particularly important on and around Toad Mountain near Nelson, B.C., the best known mine being the Hall or Silver King mine described below.

Gold Bug Claim, Deadwood Camp, Kettle River Mining Division, Yale District, B.C. ... *Boundary Creek Mining and Milling Co.*

629. Native silver, galena and chalcopyrite.

King Solomon Claim, Copper Camp, Kettle River Mining Division, Yale District, B.C. } *D. C. Corbin, Spokane, Wash., U.S.*

623. Cuprite and malachite.

Indiana Claim, Whitewater, Ainsworth Mining Division, West Kootenay, B.C. } *Indiana Gold and Silver Mining Co.*

453. Chalcopyrite, galena and siderite.

Silver King Mine, Toad Mt., Nelson Mining Division, West Kootenay, B.C. } ...... *Hall Mines, Ltd., Nelson, B.C.*

594. Bornite and chalcopyrite.

Situated on Toad Mountain, near Nelson, was, except the Blue Bell, the first discovered mine of the Kootenay district. The claim was located in 1887 by the Hall Bros., and work on it has continued ever since in a steady manner. The vein is a silver-copper lode, occurring in greenish diabases and with indistinct walls. The ore in the upper workings is mainly bornite accompanied by tetrahedrite and copper- and iron-pyrites. In the lower workings it changes largely to chalcopyrite. The average content of the ore mined in the year 1897 was 3.7 per cent. copper and 21 oz. silver per ton. The vein is worked by four drifts, with cross-cuts, winzes, etc. A smelter designed originally to treat the ore of the Silver King mine only was built at Nelson and is connected with the mine by an aerial tramway over four miles in length. The output of the Silver King mine for the last five years aggregated over 150,000 tons of ore

Hall Mines Smelter, Nelson, B.C. .... *Hall Mines, Ltd., Nelson, B.C.*

1030*a*. Copper ore, Silver King Mine.
1030*b*. Matte.
1030*c*. White metal.
1030*d*. Copper bar.
1030*e*. Section of anode.
1030*f*. Copper slag, granulated.
1030*g*. " " coarse.
1030*h*. Lead matte.
1030*i*. Lead bullion.
1030*j*. Lead slag, granulated.
1030*k*. Lead slag, coarse.
1030*l*. Coke.
1030*m*. Coal.
1030*n*. Limestone, flux.
1030*o*. Iron ore flux.

The above exhibit of the Hall Mines Smelter will give some idea of the metallurgical work carried on at this place. The smelter is situated at Nelson, and was originally built to treat the ore from the Silver King Mine (see page 82), the composition of which is, generally speaking: silica 37 per cent., lime 8 per cent., magnesia 6 per cent., ferrous oxide 10 per cent., manganous oxide 10 per cent., copper 3 per cent., sulphur 3.3 per cent. The ore is smelted as it comes from the mine, without preliminary roasting. The resulting matte is then treated in a reverberatory furnace, producing white metal. This is calcined and smelted in a second furnace which, under favorable circumstances, produces 15 tons of copper in anode form in 24 hours.

This anode copper averages 97 to 98 per cent. copper and carries from 300 to 800 ounces silver and 5 to 30 ounces gold to the ton. It has up to the present been refined by the Balbach Smelting and Refining Co. of Newark, N.J.

The smelter has gradually taken up custom smelting, and has been adapted to treat copper and lead ores carrying gold and silver values.

The following data regarding the exhibit are furnished by the Hall Mines Smelter Co.

Fluxes:—The iron is obtained from the Glen Iron Mines, Cherry Creek, near Kamloops. The limestone comes from a point on the west side of Kootenay Lake, about 12 miles north of Kaslo.

The copper products are from the smelting of the Hall Mine ore with ores of various kinds purchased. In the case of copper bullion and anode, these were made while Trail matte was being treated. The lead bullion is the product of ore from the district generally. The slags, both copper and lead, are typical.

The analysis of the coke will be, approximately, 90 per cent. fixed carbon, 7.5 per cent. ash, which may be taken as a fair average of that received from the ovens at Fernie. The coal is also typical of the seam mined at Fernie at the Crows Nest Pass, and the analysis will be approximately 69 per cent. fixed carbon, 26.5 per cent. volatile matter, 4.5 per cent. ash, sulphur 0.5 per cent. The ash is a favourable one in these coals, being nearly neutral as regards silica and bases, if it is permissible to consider aluminium as a base.

With regard to the analysis given of the lead slag, this is a favourable one, which was produced at the time of making up the exhibit. At present the zinc oxide would probably range in the neighbourhood of 10 per cent. rather than 5 per cent., with silica and lime correspondingly lower.

	Copper Matte.	White Metal.	Copper Anode.	Copper Bullion	Lead Matte	Lead Bullion
Gold, ozs. per ton	0.5	1.1	20.0	15.0	....	5.0
Silver, "	320.0	450.0	432.0	420.0	30.0	110.0
Copper, per cent...........	48.0	70.0	98.0	98.0	10.0	....
Lead, "	....	....	....	....	8.0	93.0

		Lead Slag.	Copper Slag.	Fluxes.	
				Limestone.	Magnetite.
SiO_2	per cent	34.0	42.0	4.0	6.0
FeO	"	30.0 (with MnO)	23.0 (with MnO)	....	70.0
MnO	"			......	....
MgO	"	20.0 (with CaO)	15.0 (with CaO)	....	....
CaO	"			50.0	6.0
Al_2O_3	"	....	10.0	....	....
ZnO	"	5.0	....	....	....
Cu	"	....	0.3	....	....
Pb	"	0.2	....	......	....
Ag.	oz. per ton.........	1.0	1.2	....	....

Agricola Claim, Toad Mt., Nelson Mining Division, West Kootenay, B.C. ...... *W. H. Davidson, Nelson, B.C.*

399. Chalcocite.

Northern Light Claim, 49 Creek, Nelson Mining Division, West Kootenay, B.C. ....*H. R. Bellamy, Nelson, B.C.*

439. Quartz with chalcopyrite.

Copper King Claim, 49 Creek, Nelson Mining Division, West Kootenay, B.C. *Copper King Mining Co., Nelson, B.C.*

401. Chalcopyrite.

Victoria Claim, 49 Creek, Nelson Mining Division, West Kootenay, B.C. *Messrs. Burr and Baker, Nelson, B.C.*

403. Chalcopyrite.

Old Colony Claim, Salmo, Nelson Mining Division, West Kootenay, B.C. ....*J. P. Sholtz, Nelson, B.C.*

411. Chalcocite.

Pillchicamen Claim, McMurdo Creek, Golden Mining Division, East Kootenay, B.C. ......*H. Richardson, Golden, B.C.*

921. Galena, chalcopyrite and pyrite.

Quebec Claim, Ottertail Creek, Golden Mining Division, East Kootenay, B.C. *Anglo-Canadian Development Co., Toronto, Ont.*

991. Galena and chalcopyrite.

Ontario Claim, Ottertail Creek, Golden Mining Division, East Kootenay, B.C. *Anglo-Canadian Development Co., Toronto, Ont.*

985. Chalcopyrite and galena.

Empire Claim, Ottertail Creek, Golden Mining Division, East Kootenay, B.C. *Anglo-Canadian Development Co., Toronto, Ont.*

966. Galena and chalcopyrite.

Sunday Claim, Ottertail Creek, Golden Mining Division, East Kootenay, B.C. ....*S. Barber, Golden, B.C.*

986. Galena and chalcopyrite.

Atlanta Claim, Jubilee Mt., Golden Mining Division, East Kootenay, B.C. *Messrs. Osler and Hammond, Toronto, Ont.*

974. Galena with carbonate of copper.

Robin Hood Claim, Kicking Horse River, Golden Mining Division, East Kootenay, B.C. ....*J. D. Carlin, Field, B.C.*

978. Chalcopyrite.

Headlight Claim, Horsethief Creek, Windermere Mining Division, East Kootenay, B.C. ......*F. M. Chadbourne, Nelson, B.C.*

400. Tetrahedrite.

Fisher Claim, Dutch Creek, Windermere Mining Division, East Kootenay, B.C. ....*N. A. Allan, Windermere, B.C.*

925. Chalcopyrite, tetrahedrite and galena.

Brittle Silver Group, Sheep Creek, Fort Steele Mining Division, East Kootenay, B.C. ......*J. W. Arthur, Fort Steele, B.C.*

782. Chalcocite.

Stemwinder Claim, Mark Creek, Fort Steele Mining Division, East Kootenay, B.C. ....*N. McLeod, Fort Steele, B.C.*

784. Pyrrhotite and chalcopyrite.

Lady Elgin Claim, Grundy Creek, Fort Steele Mining Division, East Kootenay, B.C. ....*G. H. Bushby, Victoria, B.C.*

1025. Galena and chalcopyrite.

COPPER.

The copper production of Canada for 1899 was valued at over $2,500,000. This represented the copper-contents of the various copper-bearing ores mined in British Columbia, Ontario and Quebec.

In the first-mentioned province the sulphide ores carry more or less of the precious metals, so that where the proportion of these is large they have been already classed as and are exhibited under the heads of gold or silver ores. Those which are known to carry in general inconsiderable or minor values in the precious metals are classed hereunder as copper ores proper. For British Columbia, however, as in the case of the classing of the other sulphide ores of that province, the arrangement is only correct in a broad general sense, for in many cases sufficient information is not available in regard to composition. In fact, in many instances the class in which to put a given ore has had to be assumed from the known general character of the ores of the district or camp from which it comes.

In British Columbia, then, the copper produced results not merely from the working of copper ores proper, but most largely from the exploitation of the "gold-smelting," "gold-silver-copper," and "silver-copper" classes of ores.

In the eastern parts of Canada, sulphide ores of copper with little or no values in the precious metals are of widespread occurrence, but at present the whole production is represented by the copper contents of the nickel-copper ores of Sudbury, in Ontario, and by that contained in the ores extracted at the Capelton and Eustis Mines, Quebec, and burned as sulphur ores in the manufacture of sulphuric acid. These are described respectively under the headings of nickel and pyrites.

Apart from its occurrence in combination with sulphur, the metal occurs also in the native state. Keeweenian rocks, geologically similar to

the famous native-copper-bearing rocks of Keweena Point, on the south or United-States shores of Lake Superior, occur also on the Canadian side of the lake. The existence of native copper in these rocks has been known for many years, and at a few points considerable exploratory work has been done. There are still, however, areas of these rocks comparatively unexplored, and although no mines of native copper are at present working in Canada, success may be yet attained. The chief areas of these native-copper-bearing rocks are at Mamainse Point, Michipicoten Island and the islands in the mouth of Nipigon Bay and in Blake Township, all on the northern shores of Lake Superior. Native copper has also, however, been observed in many other places, some of which may eventually prove to be of economic value.

Native Copper.

Blake and Boston Mine, Blake Township, Thunder Bay District, Ont. } *Blake and Boston Copper Syndicate. —Geo. T. Marks, Port Arthur, Ont.*

169. Native copper in amygdaloid.

This property is as yet only a prospect.

Lake Superior District, Point Mamainse, Ont. } *Silver Islet Consolidated Mining and Lands Co., New York.*

204. Native copper.

Ores of Copper.

Two Kings Cl'm, 7 miles from White Horse Rapids and $3\frac{1}{2}$ miles from the Yukon River, Yukon Dis. } .... *Wm. Pierson, Paris, France.*

1155. Bornite said to be auriferous.

Hayes Mine, Alberni Mining Div., Vancouver Island, B.C. } *Nahmint Mining Co., Alberni, B.C.*

546. Chalcopyrite and pyrite.

The Nahmint Mining Co. was organized in 1898 to work four claims in Hayes Camp, on the west side of Alberni Canal, 15 miles from the town of Alberni. The development at the end of 1898 consisted of 600 feet of tunnelling and 150 feet of shaft work. The lower tunnel cuts the vein at a depth of 265 feet, where it has a thickness of 28 feet. The ore carries values in copper, gold and silver.

Lake Shore Group, Anderson Lake, Alberni Mining Division, Vancouver Island, B.C. ... *Lake Shore Mining Co., Victoria, B.C.*

699. Chalcopyrite and pyrite.

Mountain Treasure Claim, Anderson Lake, Alberni Mining Division, Vancouver Island, B.C. ....*B. Bonethrone, Vancouver, B.C.*

687. Chalcopyrite and pyrrhotite.

Great Expectation Claim, Toquart Harbour, West Coast of Vancouver Island, B.C. .... *B. Boggs, Victoria, B.C.*

683. Chalcopyrite.

Blue Bell Claim, Snug Basin, West Coast of Vancouver Island, B.C. ....*A. Schaefer, Alberni, B.C.*

695. Chalcopyrite.

Belvidere Claim, Snug Basin, West Coast of Vancouver Island, B.C. ....*J. Stark, Nanaimo, B.C.*

706. Chalcopyrite.

American Wonder Claim, Tranquille Creek, West Coast of Vancouver Island, B.C. ....*General Ashton, Clayoquot, B.C.*

701. Chalcopyrite.

Good Hope Group, Clayoquot, West Coast of Vancouver Island, B.C. ....*F. Jacobson, Clayoquot, B.C.*

705. Chalcopyrite and pyrite.

Little May Claim, Clayoquot, West Coast of Vancouver Island, B.C. ... *Hettie Green Mining Co., Alberni, B.C.*

692. Chalcopyrite.

Rothschild Claim, Clayoquot, West Coast of Vancouver Island, B.C. ... *Hettie Green Mining Co., Alberni, B.C.*

697. Chalcopyrite, pyrrhotite and magnetite.

Galena Group, Bear River, West Coast of Vancouver Island, B.C. ......*T. Drinkwater, Clayoqaoi, B.C.*

700. Chalcopyrite.

Seattle Group, Bear River, West Coast of Vancouver Island, B.C. } *Seattle Mining Co., Victoria, B.C.*

698. Chalcopyrite.

Lorna Doon Claim, Kitsalas Mountain, Skeena Mining Division, Cassiar, B.C. } .... *H. Gould.*

545. Malachite and azurite.

Singlehurst Claim, Skeena Mining Division, Cassiar, B.C. } .... *B. C. Department of Mines.*

548. Bornite.

Python Claim, Coal Hill, Kamloops Mining Division, Yale District, B.C. } *Python Mining Co., Kamloops, B.C.*

641. Chalcopyrite.

The ores of Coal Hill and its vicinity, near the town of Kamloops, occur in association with a mass of gabbro of Tertiary age, which is about six miles in length by two and a half miles in width. The ores consist principally of iron- and copper-pyrites, containing more or less gold, but accompanied with but little quartz. They follow fractured and shattered zones which generally run about east-and-west (magnetic), occurring in nests and spots in the substance of the rock itself and in jointage-planes, and sometimes forming masses or sheets of pure sulphides several inches thick. The sulphides appear to have partly replaced the rock-matter and in part to have filled intervening joints and spaces in the more or less brecciated mass. A little native copper is occasionally seen in small particles and leaves.

Kimberly Claim, Coal Hill, Kamloops Mining Div., Yale District, B.C. } .... *Kimberly Mining Co.*

656. Chalcopyrite.

Iron Mask Claim, Coal Hill, Kamloops Mining Division, Yale District, B.C. } .... *Iron Mask Mining Co.*

633. Chalcopyrite.

The work on this mine consists of a tunnel 135 feet long following the vein. The lode probably extends through the whole of the location. Three carloads were shipped to Swansea in 1898, valued at $1,537.

Lucky Strike Claim, Coal Hill, Kamloops Mining Division, Yale District, B.C. .... *B. C. Exploration Co.*

642. Chalcopyrite.

Wheal Tamar Claim, Coal Hill, Kamloops Mining Division, Yale District, B.C. — *Coal Hill Copper Mining Co., Kamloops, B.C.*

661. Chalcopyrite with pyrite and magnetite.

Pothook Claim, Coal Hill, Kamloops Mining Division, Yale District, B.C. — *Scottish Copper Mine Syndicate of B.C.*

663. Chalcopyrite in quartz.

639. Chalcocite

638. Bornite.

636. Native copper.

The ore deposit on this claim consists of bornite, copper-glance and chalcopyrite. The work done so far is a shaft some 220 feet deep and some cross-cutting.

Chieftan Claim, Coal Hill, Kamloops Mining Division, Yale District, B.C. .... *R. H. Lee.*

648. Chalcopyrite.

Truth Claim, Coal Hill, Kamloops Mining Division, Yale District, B.C. — *Truth Mining Co., Kamloops, B.C.*

635. Chalcopyrite.

O. K. Claim, Coal Hill, Kamloops Mining Division, Yale District, B.C. — *Messrs. Lane, Williamson and Harding.*

643. Chalcopyrite.

Fragment Claim, Coal Hill, Kamloops Mining Division, Yale District, B.C. .... *Dr. Wade, Kamloops, B.C.*

654. Pyrite.

Copper King Claim, Cherry Creek, Kamloops Mining Division, Yale District, B.C. .... *Copper King Mining Co.*

637. Bornite with chalcopyrite.

Cyclone Claim, Jacko Lake, Kamloops Mining Division, Yale District, B.C. .... *Nestelle & Co.*

652. Chalcopyrite and magnetite.

Grass Roots Claim, Jacko Lake, Kamloops Mining Division, Yale District, B.C, ...*Dr. Wade, Kamloops, B.C.*

651. Chalcopyrite and magnetite.

Golden Star Claim, Kamloops Mining Division, Yale District, B.C. *Kamloops Copper Mining Co., B.C.*

640. Chalcopyrite.

Bluebird Claim, Sicamous, Shuswap Lake, Kamloops Mining Div., Yale District, B.C. ....*J. W. Wright, Kamloops, B.C.*

645. Pyrrhotite.

Princess Claim, Lewis Creek, Kamloops Mining Division, Yale District, B.C. *Messrs. Ward & Graham, Kamloops, B.C.*

662. Chalcopyrite in quartz.

Buckhorn Claim, Deadwood Camp, Kettle River Mining Division, Yale District, B.C. ....*Buckhorn Mining Co.*

620. Chalcopyrite and pyrrhotite.

Morrison Claim, Deadwood Camp, Kettle River Mining Division, Yale District, B.C. *Morrison Mining Co., Greenwood, B.C.*

616. Chalcopyrite and pyrite (2 specimens).

War Eagle Claim, Greenwood Camp, Kettle River Mining Division, Yale District, B.C. *War Eagle Gold Mining Co., Greenwood. B.C.*

605. Chalcopyrite and pyrrhotite.

Old Ironsides Claim, Greenwood Camp, Kettle River Mining Division, Yale District, B.C. *Old Ironsides Mining Co., Greenwood, B.C.*

630. Chalcopyrite.

This claim adjoins the Knob Hill (see No. 499, below), and the ore is said to be similar. It is stated to average $25 in all values. A good deal of development work has been carried out.

Old Ironsides Claim, Greenwood Camp, Kettle River Mining Div., Yale District, B.C. } *Granby Mining and Smelting Co.*

468. Chalcopyrite.

Brooklyn Claim, Greenwood Camp, Kettle River Mining Division, Yale District, B.C. } ....*Dominion Copper Co.*

624. Chalcopyrite.

Stemwinder Claim, Greenwood Camp, Kettle River Mining Div., Yale District, B.C. } ....*Dominion Copper Co.*

619. Chalcopyrite and pyrite.

The ore on this claim is chalcopyrite with a gangue of lime and silica. The ore-body varies in width from 12 to 15 feet and is reported to have values of $30 to $40 in gold, 5 to 8 per cent. copper and some silver.

Knob Hill Claim, Greenwood Camp, Kettle River Mining Division Yale District, B.C. } ....*Knob Hill Gold Mining Co.*

499. Magnetite with chalcopyrite.

This claim shows a large body of magnetite ore, nearly solid, fine grained, carrying small percentages of copper and some values in gold. The ore is said to average $25 per ton in all values. The main work done on this deposit consists of a drift 400 feet long.

Snowshoe Claim, Greenwood Camp, Kettle River Mining Division, Yale District, B.C. } *British Columbia, Rossland and Slocan Syndicate, Ltd., London, Eng.*

763. Hæmatite and chalcopyrite.

B. C. Claim, Summit Camp, Grand Forks Mining Division, Yale District, B.C. } *B. C. Chartered Co., Greenwood, B.C.*

596 Chalcopyrite with pyrrhotite.

Oro Denero Claim, Summit Camp, Grand Forks Mining Division, Yale District, B.C. } *King Gold Mine Co., Rossland, B.C.*

473. Chalcopyrite.

Rathmullen Claim, Summit Camp, Grand Forks Mining Division, Yale District, B.C. } *Rathmullen Gold Mining Co., Grand Forks, B.C.*

467. Quartz with chalcopyrite and pyrrhotite.

Summit Camp, Grand Forks Mining Division, Yale District, B.C. } ....*R. Bell.*

474. Chalcopyrite.

American Eagle Claim, Wellington Camp, Grand Forks Mining Div., Yale District, B.C. } *Hugh McGuire, Grand Forks, B.C.*

464. Chalcopyrite.

Centre Eagle Claim, Wellington Camp, Grand Forks Mining Division, Yale District, B.C. } *Hugh McGuire, Grand Forks, B.C.*

598. Pyrite, chalcopyrite, pyrrhotite and carbonates of copper (4 specimens).

Diamond Hitch Claim, Brown's Camp, Grand Forks Mining Div., Yale District, B.C. } *Mammoth and Diamond Hitch Co., Grand Forks, B.C.*

472. Pyrrhotite.

Royal Victoria Claim, Brown's Camp, Grand Forks Mining Div., Yale District, B.C. } .... *Royal Victoria Mining Co.*

599. Chalcopyrite.

Twins Claim, Brown's Camp, Grand Forks Mining Division, Yale District, B.C. } ......*Porter Bros., Greenwood, B.C.*

477. Pyrrhotite.

Morning Claim, Standard Basin, Revelstoke Mining Division, West Kootenay, B.C. } *Messrs. Tiball and Wallon, Revelstoke, B.C.*

754. Chalcopyrite.

Tim Buck 2 Claim, Standard Basin, Revelstoke Mining Div., West Kootenay, B.C. } ....*A. C. Cao, Revelstoke, B.C.*

750. Chalcopyrite.

Copper Crown Claim, 49 Creek, Nelson Mining Div., West Kootenay, B.C. } *Waneta Trail Creek Gold Mining Co., Rossland, B.C.*

488. Chalcopyrite and pyrite.

Wisconsin Claim, Duck Creek, Goat River Mining Division, West Kootenay, B.C. } .... *W. P. Sloan, Nelson, B.C.*

574. Cupriferous quartz.

Lapland Claim, Duck Creek, Goat River Mining Div., West Kootenay, B.C. } .... *C. Forsland.*

563. Quartz with galena and chalcopyrite.

Black Knight Claim, Goat River Mining Div., West Kootenay, B.C. } .... *Jas. Crawford.*

558. Malachite in quartz.

Kircudbrightshire Claim, Goat River Mining Div., West Kootenay, B.C. } .... *W. P. Sloan, Nelson, B.C.*

568. Pyrrhotite, galena and chalcopyrite.

Annie Claim, Goat River Mining Div., West Kootenay, B.C. } *Messrs. John Fritsch and Geo. Ross.*

581. Chalcopyrite and galena.

Chestnut and Acorn Claim, near Donald, Golden Mining Division, East Kootenay, B.C. } *Messrs. Baines and Cooper, Donald, B.C.*

989. Tetrahedrite.

Little Brother Claim, near Donald, Golden Mining Division, East Kootenay, B.C. } *Messrs. H. Moodie & J. W. Connor.*

988. Malachite, chalcocite and galena.

Blue Bell Claim, Vermont Creek, Golden Mining Division, East Kootenay, B.C. } .... *Wm. Logan, Golden, B.C.*

996. Chalcopyrite.

Anaconda Claim, Vermont Creek, Golden Mining Division, East Kootenay, B.C. } *Messrs. Upton & Dainard, Golden, B.C.*

953. Chalcopyrite.

954. Pyrite and chalcopyrite.

Monday Claim, Spillimachene Middle Fork, Golden Mining Div., East Kootenay, B.C. } ....*Geo. Heffner, Golden, B.C.*

973. Chalcopyrite.

Spruce Claim, Spillimachene Middle Fork, Golden Mining Div., East Kootenay, B.C. } ....*Geo. Heffner, Golden, B.C.*

977. Chalcopyrite.

Hidden Treasure Cl'm, Spillimachene Middle Fork, Golden Mining Div., East Kootenay, B.C. } ....*H. Croft, Victoria, B.C.*

997. Chalcopyrite.

This claim is situated at an elevation of 4,250 feet. The deposit, which is at the contact between the limestone and slates, consists of barite, more or less impregnated with sulphides of copper, zinc-blende and galena. A shipment made from an excavation in the side of the hill is reported to have given a return of 53 per cent. copper.

McRae Claim, Spillimachene, Golden Mining Div., East Kootenay, B.C. } ....*Geological Survey.*

1169. Malachite.

Good Luck Claim, McLean Creek, Golden Mining Division, East Kootenay, B.C. } *Alexander McLean, Golden, B. C.*

995. Chalcopyrite.

Certainty Claim, Fifteen-mile Creek, Golden Mining Division, East Kootenay, B.C. } *The Certainty Gold Mining Co., Golden, B.C.*

987. Chalcopyrite.

Phœnix Claim, Quartz Creek, Golden Mining Div., East Kootenay, B.C. } *Messrs. Lapham and Baines, Golden, B.C.*

961. Chalcopyrite and pyrite.

Iron Stain Claim, Spruce Tree Creek, Golden Mining Division, East Kootenay, B.C. ....*J. W. Connor, Golden, B.C.*

960, Chalcopyrite and pyrite.

St. Paul Claim, Field, Golden Mining Division, East Kootenay, B.C. ....*P. Reddick, Field, B.C.*

979. Chalcopyrite.

Campbell Claim, Jubilee Mountain, Golden Mining Division, East Kootenay, B.C. ....*Geological Survey.*

1167. Malachite.

Lancaster Claim, Jubilee Mountain, Golden Mining Division, East Kootenay, B.C. ....*John McRae, Winnipeg, Man.*

975. Chalcocite.

Mountain Daisy Claim. Jubilee Mountain, Golden Mining Div., East Kootenay, B.C. ....*S. Redgrave, Golden, B.C.*

976. Chalcocite.

Anglo-Saxon Claim, No. 2 Creek, Windermere Mining Div., East Kootenay, B.C. *William Colmet, Windermere, B.C.*

930. Chalcopyrite.

Royal Claim, Horsethief Creek, Windermere Mining Division, East Kootenay, B.C. ....*C. A. Watt, Windermere, B.C.*

932. Chalcopyrite.

Morning Glory Claim, Copper Creek, Windermere Mining Div., East Kootenay, B.C. *Messrs. Ellis and Jones, Windermere, B.C.*

798. Chalcopyrite.

Dutchy Claim, Dutch Creek, Windermere Mining Division, East Kootenay, B.C. ......*W. B. Abell, Windermere, B.C.*

942. Chalcopyrite.

Nickel Plate Claim, Dutch Creek, Windermere Mining Division, East Kootenay, B.C. .... *J. Lamb, Windermere, B.C.*

941. Chalcopyrite.

Swansea Claim, Windermere Mining Division, East Kootenay, B.C. } *Derby Mining Co., Windermere, B.C.*

943. Cupriferous veinstone.

944. Chalcocite.

945. Malachite.

946. Tetrahedrite and malachite.

947. Azurite and malachite.

Situated on Windermere Mountain at an elevation of 5100 ft. The country-rock is quartzose limestone and the deposit occurs in a zone which shows evidence of a series of faults. The crushed material of this shattered zone has been more or less cemented and mineralized by infiltrations. A sample taken from a lot of 20 to 30 tons was found to assay 17.5 per cent. copper.

Black Prince Claim, Boulder Creek, Windermere Mining Division, East Kootenay, B.C. } ....*T. Troyer, Windermere, B.C.*

926. Chalcopyrite and bornite.

Delos Claim, Boulder Creek, Windermere Mining Division, East Kootenay, B.C. } *Messrs. Jones and McNeish, Golden, B.C.*

948. Chalcopyrite.

This claim as well as three others of the same group is situated on the right-hand bank of Boulder Creek. The deposit consists of quartz stringers in a belt or zone of slates some 150 feet in width. The stringers vary in size from 1 to 24 inches. Some development has been done on the Delos mainly on a quartz ledge about 20 inches wide. A sample of the ore gave an assay of 32.48 per cent. copper with traces of silver.

Pretty Girl Claim, Boulder Creek, Windermere Mining Division, East Kootenay, B.C. } ...*W. Mitchell Innis, Golden, B.C.*

956. Tetrahedrite.

This is situated near the head of Boulder Creek, at an elevation of more than 3000 feet above the valley of Boulder Creek, which itself has an altitude of 6200 feet. The work done on this claim consists of open cuts and some tunnelling. The ore is a gray copper and carbonate. A sample gave 26.68 per cent. copper and 55 oz. silver per ton.

Wasa Claim, Wasa Creek, Fort Steele Mining Division, East Kootenay, B.C. } ....*A. B. Grace, Fort Steele, B.C.*

788. Tetrahedrite in quartz.

The vein as exposed by a tunnel is of quartz, some two feet thick between a black slate and a white schistose limestone. The ore is composed of gray copper, and copper carbonates and oxides, and assays are said to have yielded 22 per cent. copper, 11 oz. silver and $10 gold, per ton.

Try Again Claim, Four-mile Creek, Fort Steele Mining Division, East Kootenay, B.C. } *A. W. Bleasdell, Fort Steele, B.C.*

549. Chalcopyrite.

Bruce Claim, Lost Creek, Fort Steele Mining Division, East Kootenay, B.C. } *N. A. Wallinger, Fort Steele, B.C.*

776. Chalcopyrite and bornite in quartz.

Last Chance Claim, Lost Creek, Fort Steele Mining Division, East Kootenay, B.C. } ....*C. M. Keep, Fort Steele, B.C.*

775. Tetrahedrite in quartz.

Dibble Group, Lost Chance Creek, Fort Steele Mining Division, East Kootenay, B.C. } ....*C. M. Keep, Fort Steele, B.C.*

791. Tetrahedrite.

At the head of Lost Creek. Some work has been done on this property, consisting of a shaft, tunnels and open-cuts. In the shaft a body of high-grade copper ore, grey copper with silver and gold values, was encountered. The development, however, has not yet been sufficient to prove any continuous ore-body.

Tontine Group, Bull River, Fort Steele Mining Division, East Kootenay, B.C. } ....*C. M. Keep, Fort Steele, B.C.*

786. Quartz with chalcopyrite.

Corporal Claim, Bull River, Fort Steele Mining Division, East Kootenay, B.C. } ....*B. C. Department of Mines.*

1027. Chalcopyrite.

Chicamon Stone Claim, Bull River, Fort Steele Mining Division, East Kootenay, B.C. ....*John Fink, Fort Steele, B.C.*

787. Tetrahedrite.

Brewer Claim, Fort Steele Mining Division, East Kootenay, B.C. ....*S. Brewer.*

551. Tetrahedrite.

Phillip's Claim, Tobacco Plains, Fort Steele Mining Division, East Kootenay, B.C. *N. A. Wallinger, Fort Steele, B.C.*

777. Chalcopyrite and limonite in quartz.

St. Mary's Claim, Fort Steele Mining Division, East Kootenay, B.C. *N. A. Wallinger, Fort Steele, B.C.*

792. Tetrahedrite.

ONTARIO.

Point Mamainse, Lake Superior District, Ont. *Silver Islet Consolidated Mining and Lands Co., New York.*

200. Chalcocite.

Locations W. D., 220 to 227, Goulais Bay, Algoma District, B.C. *Superior Copper Co., Goulais Bay, Ont.*

232. Chalcopyrite.

The vein from which the specimen is taken is said to be 22 feet wide. Assays are reported to have given results varying from 5.35 per cent. to 25.44 per cent. copper, with $1.00 gold, $1.50 silver and 7.53 per cent. lead.

Bruce Mines, Lake Huron, Algoma District, Ont. *Lake Huron Copper Syndicate, Palmerston Bldg., Old Broad St., London, Eng.*

324. Chalcopyrite.

The Bruce Mines were the first discovered in this district and work was commenced in 1846. Subsequently operations were commenced on the adjacent Wellington and Huron Copper Bay locations, and all three mines were eventually worked under the name of the West Canada Mining Company. The veins all run in a north-westerly direction, and

carry copper sulphides in a gangue of white quartz. They cut a dark-green finely crystalline diorite. The workings had a lineal extent of about a mile and a half. On the Bruce location, in addition to working the main veins, several parallel veins were opened, the largest of which was four feet wide. On the other two locations, however, operations were almost entirely confined to two principal veins, each of which varied in width from about four to about twenty feet. Work stopped in 1876. From 1858 to the closing down of the mines in 1876, statistics show that a total of about 40,000 tons of ore, concentrates and other copper products were produced and sold for about $3,000,000. A portion of this group is now being drained and examined.

Rock Lake, Algoma District, Ont. } *Rock Lake Mining Co., Sault Ste. Marie, Ont.*

162. Chalcopyrite in quartz.

162*a*. Chalcocite (2 specimens).

This deposit is situated twelve miles north of Bruce mines. The lode is reported to be eighteen feet wide and has been traced on the property for a length of three miles. The location comprises an area of 1400 acres. Work of development was started in 1897 on an outcrop about 300 feet above the level of Rock Lake.

Parry Sound, Ont. } *Imperial Copper Co. of Parry Sound, Toronto, Ont.*

318. Bornite.

Copper King Mine, Lot 26, Con VII, Madoc Township, Hastings Co., Ont. } *Copper King Mining Co., Detroit, Mich.*

176. Chalcopyrite.

QUEBEC.

South Ham Township, Wolfe Co., Que. } ....*Dr. Reed, Reedsdale, Que.*

336. Pyrites.

This pyrites occurs in serpentine and diorite rocks, in small veins disseminated through the rock. Several mines were at one time opened in Ham and South Ham, but have long since been closed.

The deposits of pyrites of the Eastern Townships occur in rocks of pre-Cambrian age. The ore is a mixture of iron-pyrites and chalcopyrite carrying an average of 3 to 4 per cent. of copper and 42 per cent. of sulphur.

Huntingdon Mine, Lot 8, Range VIII, Bolton Township, Brome Co., Que. .... *Geological Survey.*

31. Chalcopyrite.

The ore of this mine consists chiefly of copper-pyrites mixed with pyrrhotite a large deposit of which occurs in chloritic slates in contact with serpentines and diorites. This mine was worked from 1865 to 1873, and in a desultory fashion subsequently, but no mining is at present being carried on. The ore yielded between 4 and 5 per cent. of copper.

Harvey Hill Mine, Lot 18, Range XV., Leeds Township, Megantic Co., Que. *Dr. J. Reed, Reedsdale, Que., and Geological Survey.*

23. Bornite.

24. Chalcopyrite.

The country rock at this mine consists chiefly of finely micaceous or nacreous schists. Purple copper ore, copper-glance, and copper-pyrites are found both in veins cutting the strata and in beds conformable with the stratification. The veins, which are irregular and lenticular in shape, have a gangue of quartz and dolomite with more or less calcspar and chlorite and in places contain titanic iron-ore, molybdenite and small quantities of native gold. In the beds the copper ore is distributed throughout the nacreous schists in small patches, generally of a lenticular form, as well as in irregular crystals and grains.

Mining operations were carried on here for many years, and works for the treatment of the ore by the Hunt & Douglass process were erected at the mine, which were, however, subsequently destroyed by fire. Operations have been suspended since 1879.

Lot 25, Range I., South Ham Township, Wolfe Co., Que. .... *Dr. J. Reed, Reedsdale, Que.*

335. Chalcopyrite.

Acton Township, Bagot Co., Que.................................. *Geological Survey.*

20. Copper ore, bornite.

Copper ores of this class have been worked in several places in Acton township in past years. Beyond, however, prospecting and development work, nothing extensive has been done for a long period.

NOVA SCOTIA.

Cheticamp, Cape Breton Co., N.S..... } *Cheticamp Gold Mining Co., Halifax, N.S.*

845. Chalcopyrite.

846. Chalcopyrite and zinc blende.

French Road, Cape Breton Co., N.S...... *W. N. Young, North Sydney, N.S.*

804. Chalcopyrite.

Coxheath, Cape Breton Co., N.S...... } *Cape Breton Copper Mining Co., Coxheath, N.S.*

828. Chalcopyrite.

828*a*. "

828*b*. "

828*c*. "

828*d*. "

The deposits of Coxheath, near Sydney, are those which have attracted most attention among the copper discoveries of Nova Scotia. The ore in this case occurs as copper-pyrites in pre-Cambrian felsites. Considerable development work has been accomplished, and trial shipments were made to Boston, Mass., where the ore was smelted and is reported to have given satisfactory results.

George River, Cape Breton Co., N.S. } ......*C. Moffatt, North Sydney, N.S.*

906. Chalcopyrite.

183. "

The specimens are from a vein about 28 feet wide, situated on George River Mountain, about 600 feet above water level. This vein is some seven miles from the town of North Sydney, and is only half a mile from the line of the Intercolonial Railway.

Polson Lake, Antigonish Co., N.S.................. *J. Kirk, Polson Lake, N.S.*

871. Chalcopyrite.

Ohio, Antigonish County, N.S........................ *H. McInnis, Ohio, N.S.*

822. Chalcopyrite, with specular iron ore.

Copper ore occurs at several geological horizons in Antigonish county, and in some cases large sums of money have been expended in testing copper properties. At Lochaber, Polson Lake and Ohio it is associated with pyroclastic rocks. Several veins have been tested, showing widths from a few inches to five feet, and some of these contain a high percentage of copper.

Antigonish, N.S. .... *A. McGillivray, Antigonish, N.S.*

816. Chalcopyrite.

Wentworth, Cumberland Co., N.S.... } *Copper Crown Mining Co., Pictou, N.S.*

800. Chalcocite associated with bituminous coal.

New Annan, Cumberland Co., N.S. } *Copper Crown Mining Co., Wentworth and Pictou, N.S.*

891. Copper ore.

Truro, Colchester Co., N.S. .... *W. Creelman, Truro, N.S.*

821. Chalcopyrite.

Port-au-Pique River, Colchester Co., N.S. } *Dr. E. L. Peppard, Great Village, Colchester Co., N.S.*

899. Chalcopyrite.

LEAD.

(See also under Silver-lead Ores pp. 63—81).

The ores of lead produced in Canada during 1899 carried a total content of the metal of nearly 22,000,000 lbs., having a market value closely approaching $1,000,000. Only a small proportion of the ores are smelted in the country, most of them being shipped to smelters in the United States. With the exception of small lots from other parts of Canada, the production is all that of British Columbia. The deposits of that province have already been dealt with under the heading of silver-lead ores (p. 63), so that it is only necessary here to refer to the lead deposits of the eastern provinces. The galenas of British Columbia have been considered as silver ores on account of their generally high average content of that metal. The galena ores of the eastern portions of the country, while carrying a certain amount of silver, are rather to be considered as lead ores with greater or less accessory silver values.

A number of veins holding galena, often accompanied by much zinc blende, are known to occur in the Huronian and Laurentian rocks of Ontario and Quebec. On some of these a certain amount of exploratory work has been done, and small shipments of ore have been occasionally

made, but no definite and continuous lead mining industry has so far existed. There are also deposits of galena ores in New Brunswick and Nova Scotia, but no actual mining is at present in progress.

Victoria Mine, Garden River, Sault St. Marie, Algoma District, Ont. } *Canadian Copper Co., Sudbury, Ont.*

317. Galena.

222. " shipping ore.

222a. " concentrating ore.

This mine is situated near Garden River and about eight miles north of its mouth. The galena occurs in stringers, grains and small bunches in a belt of green schists, glossy and cleaving in all directions. The galena is argentiferous, and is often mixed with blende and iron and copper-pyrites. Work on this deposit was commenced in 1875. Shipments were made from 1878 to 1880. Two shafts were sunk, one 410 and the other 100 feet, and drifts and cross-cuts driven. No work is at present in progress.

Analyses made recently of samples from which specimens 222 and 222a were taken gave the following results :

	Sample 222.	Sample 222a.
Silver	19 oz.	14.5 oz.
Gold	trace	$6.00
Copper	5.62 p.c.	2.20 p.c.
Lead	53.2 p.c.	5.72 p.c.
Zinc	9.76 p.c.	22.8 p.c.

Goulais Bay, Algoma District, Ont.. } *Superior Copper Co., Goulais Bay, Ont.*

233. Galena.

The specimen is from a location of 640 acres, 12 miles from the shore of Lake Superior. Assays gave 7.53 per cent. lead. The vein is reported as being 22 feet wide and consists of an association of chalcopyrite and galena.

Hollandia Mine, Lot A, Con. VI., Madoc Township, Hastings Co., Ont. } *Grand Calumet Mining Co., Ottawa, Ont.*

179. Galena.

This mine is three miles north of Bannockburn village. The galena is practically non-argentiferous. It occurs in a gangue of calcite, associated with small quantities of copper and iron-pyrites. The vein

seems to be well defined, being about 30 inches wide and having a strike of about S. 40° E. The work so far consists of pits and open-cuts only, but it is intended to sink a shaft from the bottom of the main pit.

Katherine Mine, Lot 7, Con. XI., Lake Township, Hastings Co., Ont. } *British Colonial Mining and Development Co., Ltd., Millbridge, Ont.*

175. Galena.

175a. Zinc-blende.

Lot 20, Con. VIII., Fitzroy Township, Carlton Co., Ont. } ....*W. Pierson, Paris, France.*

1145. Galena.

Grand Calumet Mine, W. ½ Lot 10, Range IV., Calumet Island, Pontiac Co., Que. } *Grand Calumet Mining Co., Ottawa, Ont.*

333. Galena.

A good deal of development work has been done on this deposit, which has been worked intermittently for several years and has changed hands several times. The galena is associated with a zinc-blende and carries silver. An analysis of the ore gave the following results: zinc, 40 per cent; lead, 12 per cent; silver, 15 oz. to the ton. Other specimens show a preponderence of lead.

Smithfield, Guysborough Co., N.S. ....*J. Kirk, Halifax, N.S.*

872. Galena, argentiferous.

Smithfield, Colchester Co., N.S. ....*G. E. Franklin, Halifax, N.S.*

863. Galena, argentiferous.

Cheticamp, Cape Breton Co., N.S.... } *Silver Cliff Gold Mining Co., Cheticamp, N.S.*

841. Galena and pyrite.

Cheticamp, Cape Breton Co., N.S.... } ....*Silver Cliff Mining Co.*

877. Galena.

The property from which this specimen is taken is situated some four miles from Pleasant Harbour and includes ample water power. Assays of the ore show silver to the present. Development work is in progress.

Cheticamp, Cape Breton Co., N.S. ... } *Cheticamp Gold Mining Co., Halifax, N.S.*

844. Galena with chalcopyrite and pyrrhotite.

Faribault Brook, Inverness Co., N.S. } *Cheticamp Gold Mining Co., Halifax, N.S.*

340. Galena.

This deposit of galena was discovered in 1896, while prospecting for gold, on Faribault or L'Abime Brook. The face of the opening is stated to show 20 per cent. galena and 3 per cent. copper. The ore is reported to carry on an average 1 oz. of silver for every unit of lead, with gold in places up to 14 dwt. per ton.

ZINC.

Canada has no zinc mining industry proper so far. Blende occurs as a plentiful constituent of many of the galena deposits of the east, and also in those of British Columbia, and a certain amount of this mineral has been produced in some years in mining these deposits. The blende deposit of the Zenith mine is receiving attention at present, and, should success attend the work, there may be a regular production to report in future years. So far, however, zinc ores are represented only by the blende produced as a by-product in exploiting deposits of other minerals.

Zenith Mine, Lake Superior, Thunder Bay District, Ont. } *Grand Calumet Mining Co., Ottawa, Ont.*

207. Blende.

This occurrence is situated on the White Sand River, some ten miles northward of the shore of Lake Superior, near Schreiber Station, on the Canadian Pacific Railway. The ore is described as occurring principally in two large veins or lenticular masses in a hornblende-rock and diorite of Huronian age. A specimen analysed in the laboratory of the Survey gave about 54 per cent. of metallic zinc.

West ½ Lot No. 10, Range IV., Calumet Island, Pontiac Co., Que. } *Grand Calumet Mining Co., Ottawa, Ont.*

320. Blende.

The ore of this deposit is an association of zinc-blende and galena, the former predominating. The deposit has been worked to some extent but is at present idle.

PLATINUM.

North Bend, Fraser River, Yale District, B.C. — *Beatty Gold Dredging and Mining Co.*

1101. Platinum, obtained in dredging.

Quesnel Forks, Cariboo District, B.C. — *Consolidated Cariboo Hydraulic Mining Co.*

1068. Platinum, obtained in hydraulic workings.

Tulameen or N. Fork of Similkameen River and vicinity, Yale Dist., B.C. — *Baker & Co.*, 120 *Liberty St., Newark, N.J., U.S.A.*

1015. Platinum, crude.

1015*a*. " 2 nuggets.

1015*b*. " 16 small nuggets.

1015*c*. " crude.

The occurrence of platinum in association with placer gold is frequent in several parts of the province of British Columbia. The metal occurs in notable quantities in the region of the Upper Similkameen and Tulameen, in minute scales where the gold is fine but increasing in coarseness to small pellets in places where coarse gold is found. Coarse grains and pellets of platinum have been found on Granite, Cedar and Slate Creeks, all entering the Tulameen on the south side. The metal is found alloyed with several other metals of the same group, of which osmiridium is the most abundant.

Vermilion Mine, Denison Township, Lot 6, Con. IV, Algoma Dist., Ont. — *Canadian Copper Co., Cleveland, Ohio, U.S.A.* (*Works at Sudbury, Ont*).

223. Gossan holding sperrylite.

371. Palladium and platinum ore.

At this mine a shaft called No. 1 has been sunk in diorite to a depth of about twenty feet on a promising vein of chalcopyrite. On exposure to the weather the ore is remarkable for becoming tarnished of a deep purplish-blue colour like that of bornite. The vein occurs in diorite, and is about four feet wide, but without distinct walls or any veinstone except a mixture of the country-rock. The upper ten feet were decomposed to a loose gossan, holding fragments of rock. The new mineral sperrylite (arsenide of platinum with a little tin), was found by washing

this material, and according to Mr. R. R. Hedley, 12 dwts. of gold to the ton were found in one assay of ore from this shaft. A few specks of gold were seen in iron-stained spots on the weathered surface of the diorite close to the shaft.

Sudbury, Ont.................................*Baker & Co., Newark, N.J., U.S.A.*

1016. Sperrylite (30 per cent. platinum).

MERCURY.

No ores of mercury are at present regularly worked in Canada, and the only deposits so far discovered that appear to be of probable economic importance are those represented by the specimens catalogued below.

Copper Creek, Kamloops, B.C. } *Hardie Mountain Cinnabar Syndicate, Kamloops, B.C.*

727. Cinnabar.

Almaden Claim, Hardie Mountain, Kamloops, B.C. } *Kamloops Cinnabar Mining Co., Kamloops, B.C.*

634. Cinnabar.

634*a*. Cinnabar and metacinnabarite.

These deposits of mercury ore are situated at a distance of about three miles from each other, both near the west end of Kamloops Lake. The main country-rock is a Tertiary volcanic eruptive containing pyroxene and olivine and very basic in character. It is traversed by decomposed felspathic zones containing veins of quartz, calcite and dolomite with cinnabar, which in some places occurs in very rich pockets; often, however, it is disseminated through the adjacent rock. A number of claims have been taken up in this vicinity since 1892, and some mercury has been produced and shipped, but the retorts first erected proved unsuitable for the lower grades of ore. Exploratory work is still in progress and it is not improbable that important developments may occur in connection with this cinnabar-bearing belt.

ANTIMONY.

South Ham, Wolfe Co., Que.......................... *Dr. J. Reed, Reedsdale, Que.*

326. Antimony ore.

This is the only deposit of antimony ore of economic value known in the province of Quebec. The width of the principal vein at the surface was from six to sixteen inches, the gangue consisting of quartz and dolomite. This intersects magnesian slates and schists, presumably of Cambrian age. The ore consists of native antimony, sulphide of antimony (stibnite), with small quantities of valentinite and kermesite.

Prince William, York Co., N.B. .... *Geological Survey.*

226. Stibnite.

Ores of antimony have been known to occur in Prince William since 1865. The deposits are about three miles from the St. John River, and twenty-five miles from Fredericton. The ore occurs in connection with veins of milky quartz some intersecting and others coinciding with the planes of the beds of slates and quartzites which are highly disturbed and show evidence of metamorphism. The area over which antimony bearing rocks have been recognized is about 350 acres, the quartz veins in which stibnite occurs both in veinlets and masses, varying from a few inches to six feet. Native antimony has also been found. These deposits were formerly worked to a considerable extent. They are at present idle, although the quantity and quality of the ore are believed to be satisfactory.

West Gore, Hants Co., N.S.............................. *A. McNeil, West Gore, N.S.*

819. Stibnite.

The deposit of antimony ore known as West Gore mine is an important one. It consists of a vein about six feet wide, of which about twenty inches is pay-ore consisting of stibnite, kermesite, valentinite, galena and a small amount of gold, in a gangue of calcite. The vein cuts grey talcose slates which strike east and west and dip south 45 deg. The first grade of ore contains from fifty to eighty per cent. of antimony, a second grade being concentrated to about fifty-four per cent. This mine was in active operation for several years, but as a result of the reduced price of antimony, has been idle since 1892. Operations have recently been resumed.

NICKEL.

The working nickel mines of Canada are all situated in the vicinity of Sudbury on the main line of the Canadian Pacific Railway north of the Georgian Bay, Ontario.

Although the works of the Canadian Copper Co., described later, are the only ones in operation at present, other plants have been operated at the Murray Mine, at the Dominion Mine and at the Trill Mine. These have been idle for some years now.

In 1899 Canada supplied about half the world's production of this metal. For the past five years the amount of metallic nickel in the matte shipped has varied from about three and a half to nearly five million pounds, worth, at the market prices ruling for the refined metal, from nearly one and a half million to over two million dollars per annum.

The North Star Mine, Snider Township, Algoma District, Ont. .... *A. McCharles.*

235. Pyrrhotite (nickeliferous).

This location comprises 230 acres and is five miles from the railway and eight miles from Sudbury. The ore is said to carry 4 per cent. of nickel.

The Kirkwood Mine, Lot 8, Con. III, Garson Township, Algoma District, Ont. — *Orford Copper Co., Newark, N.J., U.S.A.*

236. Chalcopyrite and pyrrhotite (nickeliferous).

This is a comparatively recent discovery. It is situated about six miles north-east of Sudbury. The ore-body is a mixture of chalcopyrite and pyrrhotite carrying nickel, resembling that found in the other mines of Sudbury district. A certain amount of development was done on the property, but operations are suspended at present.

The Clergue Mine, Lots 3, 4 and 5, Con. I, Creighton Township, Algoma District, Ont. — *The Sault Ste. Marie Pulp and Paper Co., Sault Ste. Marie, Ont.*

237. Pyrrhotite (nickeliferous).

A little development work has been done on this property.

The Vermilion Mine, Denison Township, Algoma District, Ont. — *Canadian Copper Co., Sudbury, Ont.*

221. Chalcopyrite and bornite (nickeliferous.)

Lot 5, Con. II., Blezard Township, Nipissing, Ont. } *The Great Lakes Copper Company, Sudbury, Ont.*

329. Pyrrhotite.

330. Chalcopyrite and pyrrhotite (nickeliferous).

Lot 1, Con. II, Drury Township, Algoma District, Ont. } ....*Henry Totten, Toronto, Ont.*

201. Pyrrhotite (nickeliferous).

201*a*. Chalcopyrite, pyrrhotite and niccolite.

The Sultana Mine, Worthington, Algoma District, Ont. } *Messrs. J. Everett and J. C. Miller.*

219. Pyrrhotite (nickeliferous).

This mine is eight miles north of Worthington.

Sudbury, Ont. } *Joint exhibit by Orford Copper Co., Newark, N.J., U.S.A., and The Canadian Copper Co. Works at Sudbury, Ont*

368. Pyrrhotite (nickeliferous).

369. Chalcopyrite.

370. Pyrrhotite and chalcocite (copper-nickel ore). From the Copper Cliff Mine, Sudbury.

371*a*. Standard copper-nickel matte.

371*b*. Single-blow bessemerized nickel matte.

371*c*. Pyritic matte produced from the first run of fifty tons of copper ore, with cold blast. No carbonaceous or other fuel used other than sulphur and iron contents of the ore.

371*d*. Heap-roasted copper-nickel matte.

371*e*. Granulated slag waste.

371*f*. Vermilion Mine copper-nickel ore.

371*g*. Nickel oxide, 77.35 per cent.

371*h*. Nickel sulphide, 68.91 per cent.

371*i*. Powdered nickel, 96.375 per cent.

371*j*. Nickel shot, 99.25 per cent.

371*k*. Nickel plaquettes, 99.30 per cent.

The Canadian Copper Co. hold 13,000 acres of nickel lands in the Sudbury district. The ore is a mixture of pyrrhotite and chalcopyrite

in diorite, the metallic contents averaging about 2.5 per cent. nickel and 2.5 to 3.0 per cent. copper.

The Copper Cliff mine is situated at the village of Copper Cliff, where are located the offices and works of the company. The mine is worked from an incline shaft 810 feet deep, with 11 levels. The ore, which on the surface was almost pure chalcopyrite, has gradually given place to nickeliferous pyrrhotite.

The ore is hoisted, crushed and sized in the rock house. It is then sent to the roast yard, where it is roasted in heaps. After roasting, the ore is sent to the smelter for conversion into matte. The average standard matte produced of late years contains: copper 18 to 19 per cent., nickel 10 to 15 per cent., the rest being mostly iron and sulphur.

The company ship their product in the shape of matte of the grade above given to the Orford Copper Co., of Constable's Hook, N.J., U.S.A., where the process of extraction of the various metals is completed, resulting in the various products exhibited.

Net Lake, east of Lake Temagami, Nipissing District, Ont. .... *Ont. Bureau of Mines.*

726. Pyrrhotite and chalcopyrite.

From a location recently acquired by the Canadian Copper Co.

The Huronian belt of rocks, characterized by the presence of great deposits of nickeliferous and cupriferous ores in the Sudbury district, runs with unbroken continuity through the Temagami and Temiscaming district. At several places large quantities of pyrrhotite and chalcopyrite have been noted, but the assays show only a very small percentage of nickel. It is probable that systematic prospecting may develop large deposits containing copper and nickel.

Sudbury, Ont. .... *The Lake Superior Power Co., Sault St. Marie, Ont.*

674. Pyrrhotite (nickeliferous).

674*a*. Pig of ferro-nickel.

674*b*. Section of pig of ferro-nickel (polished).

N. ½ Lot 8, Con. IV., Denison Township, Ont. *Dr. Ludwig Mond, London, England.*

664. Pyrrhotite and chalcopyrite (nickeliferous).

664*a*. " " "

Lot 12 or 13, Range IX., Calumet Island, Pontiac Co., Que. .... *Geological Survey.*

34. Niccolite.

344. Pyrrhotite.

This deposit, discovered in 1898, consists of a body of diorite impregnated with pyrrhotite. A pit was sunk on the body of ore, and at a depth of some twenty feet a small vein of niccolite was struck. An analysis of the vein-stuff, made by Mr. Milton Hersey, Montreal, gave 3.33 per cent. nickel and .35 per cent. cobalt.

Memphremagog Mine, Bolton Township, Brome Co., Que. .... *Geological Survey.*

761. Pyrrhotite.

St. Stephen, Charlotte Co., N.B. ....*Geological Survey.*

229. Pyrrhotite (nickeliferous).

The presence of nickeliferous deposits in Charlotte county New Brunswick was pointed out in the Report of Progress of the Geological Survey as early as 1870 and 1871, when Dr. T. Sterry Hunt showed that the rocks of supposed Huronian age were traversed by dark-green serpentines, which carried chromic oxide and nickel. A few years later, attention was directed to large deposits of pyrrhotite which also showed a small percentage of nickel. Three or four important deposits have been noticed on the banks of the St. Croix River, specimens from which on analysis revealed contents of nickel varying from ½ to 4 per cent. Compared with the well-known deposits of Sudbury, Ont., these nickel-bearing rocks show many features in common, although the St. Stephen ores are not so reliable as to the contents of nickel, which is more variable and lower than in the Sudbury bodies.

COBALT.

Cobalt ores have not yet been produced in economic quantities in Canada. The Sudbury nickel ores carry a small proportion of this metal, however, and one specimen has been sent from British Columbia.

St. George Claim, Goat Mountain, Goat River Mining Division, B. C. ....*B. C. Department of Mines.*

564. Cobalt bloom,

Said to contain 15 per cent. of cobalt.

IRON.

Ores of iron are widely distributed throughout Canada and in great variety. They are smelted in Nova Scotia, Quebec and Ontario, but although workable ores are by no means lacking in the western half of the country, the economic conditions are such, as yet, that no works of this nature have been started. The agricultural prairie section of Canada should, when more densely settled, provide a local market for iron and iron goods, calling for the erection of smelters on the northern shore of Lake Superior, which will use the ores found so plentifully in the numerous areas of Huronian rocks occurring in the vicinity of that large inland sea. In British Columbia the rapidly growing demand for machinery in connection with the development of the extensive mineral resources of that province and the existence of good fuel on the coast, should certainly lead in the immediate future, to the use of local ores in the production of pig-iron and all the train of manufactures following thereon.

Compared with the extent, known and probable, of Canada's iron ore resources, however, the smelting operations in the east already alluded to, can be regarded but as a commencement in an industry which will eventually grow to much larger dimensions.

The smelting facilities on the seaboards both of the Atlantic and Pacific coasts and the existence there of valuable coal-fields, suggest also wide possibilities in the utilization of the iron product in ship building, and the erection of the large works of the Dominion Iron and Steel Company now in course of construction at Sydney, Cape Breton, would seem to bring such a consummation within a measurable distance.

There were in Canada during 1899 nine furnaces, owned by seven companies. Only seven of these were operated, by six firms, the Londonderry, N.S., firm, with two furnaces, having been idle for some years. A very important addition to the list is the plant of the Dominion Iron and Steel Company of Sydney, Cape Breton, N.S., now in course of construction. As planned, this will have an extension along the water front on Sydney harbour of over a mile and a half, and besides four furnaces, will include an open-hearth plant, blooming mill, etc. The daily capacity of the former will, it is said, be from 250 to 300 tons each, and of the latter will be about 800 tons per day.

The completed furnaces in Canada are located as follows:—

In Nova Scotia: The Londonderry Iron Company, with two furnaces at present idle; the Nova Scotia Steel Company, with one furnace, and the works of the Pictou Charcoal Iron Company, now operated by the Mineral Products Company of Hillsborough, N.B., which has just commenced to make spiegel from Nova Scotia ores in conjunction with the manganese ores of New Brunswick.

In Quebec: Two firms operate on the bog iron ores of that province, viz:—The Canada Iron Furnace Company at Radnor, with one furnace, and Messrs. McDougall & Co. at Drummondville, with two.

In Ontario: The Hamilton Blast Furnace Company operate one furnace, with a capacity of two hundred tons per diem, and a furnace has just been completed for the Deseronto Iron Company, at that place, of about 35 to 40 tons capacity per day. The latter uses only foreign ores, whilst at Hamilton partly United States and partly Canadian ores are charged.

The following figures, taken from the annual report of the Mines Section of the Geological Survey, will illustrate the condition of the iron industry in 1898 and past years.

	Charcoal Iron.		Coke Iron.	
	Tons.	Value.	Tons.	Value.
1893	9,973	$244,917	45,974	$545,366
1894	10,343	227,914	39,624	418,533
1895	7,262	158,357	45,192	538,083
1896	6,615	154,358	60,653	769,771
1897	9,392	217,235	48,615	521,466
1898	7,135	159,929	69,880	752,466

In 1898 about 11,500 tons of the production was Bessemer pig and about 9,200 was basic pig.

Canada has only one steel casting plant which is equipped with a 3,000 lb. modified acid Bessemer converter. Its first castings were produced in 1897. Canada has also one open-hearth steel plant, which makes steel both by the acid and basic process. The total number of rolling mills and steel works in Canada on Dec. 31st, 1898, was 18. Of this number at least four were idle during the whole of 1898.

Radnor Forges, Champlain County, Quebec. — *Canada Iron Furnace Co. Montreal. Paris Agency: Usines Metallurgiques,* 53 *Rue de la Chaussee d'Antin.*

352. Bog-iron ore.

352*a*. Lake ore.

352*b*. Charcoal pig iron, Nos. 1, 1½, 2, 2½, 3, 3½, 4, 4½, 5, 6.

352*c*. Wrought iron made from the above charcoal pig iron.

Bog-iron ore is of common occurrence in the provinces of Quebec and Ontario, more especially in the sandy tracts that often flank the Laurentian hills. It occurs in concretionary masses, which, on the fresh fracture, are sometimes dull or earthy, and at other times highly lustrous. The colour is usually yellowish-brown, but dark-brown or black when much manganese is present. The concretions are scattered through the soil, or else form patches or continuous layers, which sometimes attain a thickness of several feet, though generally only a few inches in thickness.

The Canada Iron Furnace Company own an area of 100,000 acres of bog-ore rights in the districts of Champlain, St. Maurice, Three Rivers, Vaudreuil, Joliette, Gentilly, etc., including the important deposits of lake-ore in Lac à la Tortue and Lac aux Sables.

Lake ore is raised principally from Lac à la Tortue, where a steam dredge of a capacity of 50 tons a day is employed. The deposits vary somewhat in analysis, some of the bog-ores used by the company being as low as .080 per cent. sulphur and .042 per cent. phosphorus.

New Glasgow, Pictou County. N. S. } *Nova Scotia Steel Co., New Glasgow, N.S.*

854. Pig iron No. 1 foundry.

854*a*. Pig iron No. 2 foundry.

854*b*. Pig iron No. 3 foundry.

854*c*. Pig iron No. 4 foundry.

854*d*. Hæmatite pig iron.

854*e*. Pig iron, basic iron.

854*f*. Steel bars.

854*g*. Angle iron.

854*h*. Culm coal, one-third Springhill, two-thirds Reserve coal.

854*i*. Washed coal.

854*j*. Tailings.

854*k*. Coke.

The following are analyses of some of the above products :—

	854	854*a*	854*b*	854*c*	834*d*	854*e*
	p.c.	p.c.	p.c.	p.c.	p.c.	p.c.
Silicon	2.85	2.50	2.10	1.75	1.00	0.40
Manganese	0.54	0.55	0.60	0.65	0.95	0.75
Phosphorus.......	0.90	0.90	0.91	0.92	0.08	1.00
Sulphur	0.01	0.012	0.02	0.03	0.03	0.03
Graphitic Carbon.	3.70	3.20	2.50	2.00	3.12	3.27
Combined Carbon.	0.16	0.30	0.60	0.90	0.76	0.63
Copper	Nil	Nil	Nil	Nil	Nil	Nil
Arsenic..........	Nil	Nil	Nil	Nil	Nil	Nil
Barium..........	Trace	Trace	Trace	Trace	Trace	Trace

The Nova Scotia Steel Company was incorporated in 1895, and is the outcome of the amalgamation of two companies. The authorized capital is $5,000,000.

The blast furnace is at Ferrona, and is connected with the mines, limestone quarries, and Intercolonial Railway by the company's own railway. The furnace is 65 feet high and of modern design. There are three blast stoves of the three-pass Massick and Crook type, each 16½ feet in diameter and 60 feet high. The two blowing engines have steam cylinders 36 inches in diameter and air cylinders 84 inches.

The coking plant consists of 54 coke ovens of the Bernard type, the dimensions being as follows: length, 33 ft.; height, 6 ft. 6 in.; width, 23½ in.

The steel works are situated at Trenton and New Glasgow, and have a capacity of 150 tons of steel ingots per day, all of which is worked up into bars, sheets, axles, etc.

The different classes of iron ore exhibited are given below. It will be noticed that Canada produces every variety from magnetite, occurring as in eastern Ontario in irregular bodies connected with basic intrusive rocks, to the hydrated oxides of the bog ores of Quebec found in the superficial deposits.

Magnetite.

In British Columbia, although magnetites are known to occur in many places, both on the coast and in the interior, they have not as yet come into economic prominence. The Texada mines have, however, been worked from time to time as a source of iron ore, which has been smelted in conjunction with other ores in the State of Washington. The Glen Iron mine at Kamloops Lake is also worked to some extent, the ore being shipped away for use as a flux in the treatment of ores containing the precious metals. Other deposits have been drawn upon to a small degree for the same purpose. Only a small proportion of the known localities for magnetite in British Columbia are represented in the present collection.

Lord of the Isle Claim, Sechart, Barclay Sound, B.C. } .... *Mr. Anderson, Sechart, B.C.*

703. Magnetite.

From a deposit of magnetite on Sechart Peninsula, which, according to the report of the Minister of Mines, B.C., for 1896, occurs "in what appears to be diorite and next to a very extensive area of limestone that at the point of contact with the eruptive rock is completely crystallized into large coarse crystals."

Texada Island, Strait of Georgia, B.C. .... *Geological Survey.*

1182. Magnetite.

Cherry Bluff, Kamloops Lake, B.C .... *Geological Survey.*

1181. Magnetite.

Glen Iron Mine, Cherry Bluff, Kamloops Lake, B.C. } .... *Glen Iron Mining Co.*

659. Magnetite.

Kamloops Iron Mine, Kamloops, B.C. .... *Kamloops Iron Co.*

644. Magnetite.

Grass Roots Claim, Jacko Lake, Kamloops, B.C. } .... *Dr. Wade, Kamloops B.C.*

649. Magnetite with chalcopyrite.

Pothook Mine, Coal Hill, Kamloops, B.C. } *Scottish Copper Mine Syndicate of B.C.*

646. Magnetite.

Atikokan River, Thunder Bay District, Ont. } .... *Ont. Bureau of Mines.*

122. Magnetite with polarity.

From locations 10 E, 11 E and 12 E on the Atikokan River, about thirty miles southwest of Bridge River station, on the Canadian Pacific Railway. The lode has an aggregate thickness of about 100 to 125 feet, divided in places into two or three veins by belts of green chloritic schists. This, with the associated rocks, forms a range of hills about one mile in length and 300 to 400 feet in width, which rises to elevations of 60 to 125 feet. The ore is remarkably uniform in grade and percentage.

Analysis :—

	Per cent.
Ferrous oxide	29.98
Ferric Oxide	66.77
Titanic acid	none
Sulphur	0.062
Phosphorus	0.025
Alumina	0.67
Silica	2.43
	99.937
Metallic iron	70.06

Development work has lately been undertaken on a portion of the range. A tunnel is being driven through the hill with a view of forming an idea of the extent of the deposit. The only work which had previously been done on this great deposit was by diamond drillings, a few years ago, and this gave satisfactory indications.

Belmont Township, Peterborough Co., Ont. .... *Geological Survey.*

139. Magnetite (big ore bed).

139*a*. " (deep pit).

The "Blairton Ore Bed" or "Big Ore Bed," as it was formerly called, is an important deposit of magnetite and has been extensively worked. The ore is finely granular and often contains a considerable admixture of hæmatite. It occurs in a series of bodies interbanded with crystalline limestone, talcose slates, serpentines and other rocks, the whole being highly inclined. Some of the beds are very pure, but others contain a good deal of rock matter and iron-pyrites. An analysis from what is known as the "Sand-Pit" bed, gave Dr. T. S. Hunt :—

	Per cent.
Magnetic iron oxide	72.80
Magnesia	6.46
Lime	0 35
Carbonate of lime	2.40
" magnesia	0.84
Phosphorus	0.035
Sulphur	0.027
Water	3.50
Insoluble	14.73
	101.142

Belmont Iron Mine, Belmont Township, Peterborough Co., Ont. .... *T. D. Ledyard, Toronto, Ont.*

331. Magnetite.

From Nichol, MacDonnell and Forge pits.

Arthur Mine, Chandos Township, Peterborough Co., Ont. .... *Ont. Bureau of Mines.*

132. Magnetite.

Glamorgan Township, Lot 27, Con. XIII, Haliburton Co., Ont. .... *Ont. Bureau of Mines.*

198. Magnetite.

Snowdon Township, Lot 31, Con. IV, Haliburton Co., Ont. .... *Ont. Bureau of Mines.*

127. Magnetite.

An analysis of this ore by Prof. Wm. Molin, New York, shows metallic iron, 69.246 per cent.; phosphorus, .012 per cent.; sulphur .038 per cent.; Titanic acid, trace.

Emily Mine, Tudor Township, Hastings Co., Ont. .... *Ont. Bureau of Mines.*

130. Magnetite.

Dungannon Township, Lot 30, Con. XIII, Hastings Co., Ont. .... *Ont. Bureau of Mines.*

196. Magnetite.

Dungannon Township, Hastings Co., Ont. .... *Ont. Bureau of Mines.*

199. Magnetite.

Wollaston Township, Hastings Co., Ont. .... *Ont. Bureau of Mines.*

135. Magnetite.

Wollaston Township, Lot 15, Con. I, Hastings Co., Ont. .... *Ont. Bureau of Mines.*

137. Magnetite.

From a deposit said to be 1200 feet by 25 to 100 feet.

Wollaston Township, Lot 16, Con. II, Hastings Co., Ont. .... *Ont. Bureau of Mines.*

136. Magnetite.

From a deposit said to be 1400 feet by 25 to 50 feet.

Wollaston Township, Lot 17, Con. VII, Hastings Co., Ont. .... *Ont. Bureau of Mines.*

128. Magnetite.

Wollaston Township, Lot 18, Con. VIII, Hastings Co., Ont. .... *Ont. Bureau of Mines.*

134. Magnetite.

Wollaston Township, Lot 22, Con. IX, Hastings Co., Ont. .... *Ont. Bureau of Mines.*

129. Magnetite.

The deposits of magnetite of the above district are reached by the Central Ontario Railway, built in 1884. From the Coe Hill mine, Lots 15, 16 and 17, Con. VIII., Wollaston, important shipments have been made.

Madoc Township, Lot 18, Con. I, Hastings Co., Ont. .... *Geological Survey.*

140. Magnetite.

From an opening known as the Dufferin Mine.

Malone Mine, Madoc Township, Lot 18, Con. I, Hastings Co., Ont. .... *Arthur Coe, Malone, Ont.*

239. Magnetite.

Madoc Township, Lot 10, Con. VI, Hastings Co., Ont. .... *Ont. Bureau of Mines.*

125. Magnetite.

Madoc Township, Hastings Co., Ont. .... *Geological Survey.*

33. Magnetite, cobaltiferous.

33*a*. " " showing erythryte.

Lavant Township, Lanark Co., Ont. .... *Ont. Bureau of Mines.*

119. Magnetite.

Lavant Township, Lot 3, Con. XIII, Lanark Co., Ont. *W. Caldwell, Rosedale, Toronto, Ont.*

305. Magnetite.

Darling Township, Lanark Co., Ont. .... *Geological Survey.*

145. Magnetite.

Bedford Township, Frontenac Co., Ont. .... *Geological Survey.*

146. Magnetite.

Portland Township. Lot 17, Con. X, Frontenac Co., Ont. .... *Ont. Bureau of Mines.*

138. Magnetite and hæmatite.

Palmerston Township, Frontenac Co., Ont. .... *Ont. Bureau of Mines.*

194. Magnetite.

Robertsville Mine, Palmerston Township, Lots 3 and 4, Con. IX, Frontenac Co., Ont. .... *Ont. Bureau of Mines.*

133. Magnetite.

Analysis gave: metallic iron, 66 per cent.; silica, 2.14 per cent.; sulphur and phosphorus, trace.

Caldwell Mine, Palmerston Township, Frontenac Co., Ont. .... *Geological Survey.*

147. Magnetite.

Yuil Mine, Darling Township, Lanark Co., Ont. .... *Geological Survey.*

148. Magnetite.

Bagot Township, Renfrew Co., Ont .... *T. B. Caldwell.*

240. Magnetite.

Martel Mine, Bagot Township, Renfrew Co., Ont. .... *Geological Survey.*

149. Magnetite.

Kinnear's Mills, Megantic Co., Que .... *Geological Survey.*

19. Magnetite.

Bristol Township, Range II, Lot 22, Pontiac Co., Que. .... *Geological Survey.*

141. Magnetite.

This ore occurs in a series of bodies interbanded with reddish hornblendic gneisses and glistening micaceous and hornblendic schists of Laurentian age. The thickness of what appears to be the highest and most important body has not been ascertained; but the lowest one exposed is about nine or ten feet thick. The deposit was first opened in 1872. In 1891 two roasting furnaces were built which reduced the

sulphur to 0.025 per cent. The operations at the mine were discontinued in 1894. The ore, though generally known as magnetite, contains a considerable proportion of hæmatite.

The following is an analysis of this ore, published in the Report of Progress of the Geological Survey of Canada for 1873-74, p. 208 :

	Per cent.
Iron peroxide	65.44
" protoxide	14.50
" bisulphide	2.74
Manganese protox	0.11
Alumina	0.60
Lime	3.90
Magnesia	0.45
Silica	11.45
Carbonic acid	1.64
Phosphoric acid	trace.
Titanic acid	none.
Water	0.14
	100.97

South Ham Township, Lots 21 and 22, Range I., Wolfe Co., Que. .... *Dr. Reed, Reedsdale, Que.*

338. Magnetite and chromite.

Leeds Township, Megantic Co., Que .... *Dr. Reed, Reedsdale, Que.*

348. Magnetite.

From some lots in the 5th and 10th ranges.

Nastapoka Island, east coast of Hudson Bay. .... *Geological Survey*

1032. Magnetite.

Very extensive deposits of bedded iron ores occur in rocks of Cambrian age in various parts of the Labrador peninsula and along the east coast of Hudson Bay. Some of them contain a notable percentage of manganese. They have not yet been worked.

Middleton, Annapolis County, N.S .... *N.S. Department of Mines.*

830. Magnetite.

832. "

834. "

835. "

839. "

All these specimens come from the vicinity of Middleton.

East Brooklyn, Annapolis County, N.S. ....T. C. Slocombe

833. Magnetite.

This specimen is from a property on North Mountain iron belt, four miles to the north-west of Middleton. The vein has not been traced, but there is a large amount of loose ore.

North Sydney, Cape Breton County, N. S. } *A. G. Hamilton, North Sydney, N.S.*

802. Magnetite.

George River, Cape Breton County, N.S. } *M. A. McPherson, George River, N.S.*

810. Magnetite.

North Sydney, Cape Breton County, N.S. } *John Greener, North Sydney, N.S.*

812. Magnetite.

Whycocomagh, Cape Breton County, N.S. ............*N.S. Department of Mines.*

915. Magnetite.

These deposits are situated on the shore of Whycocomagh Bay, at Skye Mountain. The predominating ore is magnetite. The deposits are said to be important. Analyses of specimens made in the laboratory of the Nova Scotia Steel Company gave iron content 49 to 63 per cent. Phosphorus 0.01 to 0.5 per cent.

Hæmatite.

Sampson Claim, Arrow Creek, Goat River Mining Division, B.C. ....*Geological Survey.*

565. Hæmatite.

Desert Lake, Lake Huron, Ont....................................*Geological Survey.*

192. Hæmatite.

From Dickson's location, near Bruce Mines. This location comprises blocks A 1 and A 2, situated on the north side of Desert Lake, and about five miles from Portlock Harbour on Lake Huron. The vein cuts the greyish white Huronian quartzite, is three feet thick, and runs a little north of west and south of east. It has been traced nearly one mile on

the location, and in one place is very advantageously situated for mining. It occurs at an elevation of two hundred feet above Desert Lake, which is connected with Lake Huron by a navigable river, the Thesalon. According to Dr. Ellis of Toronto, the ore contains 56 per cent of iron, and no appreciable quantity of sulphur or phosphorus.

Helen Mine, Lake Superior, Michipicoten, Ont. } *The Lake Superior Power Co., Goulais Bay, Ont.*

675. Limonite.

675*a*. Hæmatite.

The ore is a compact hæmatite with an admixture of magnetite. The enclosing rock is very varied, consisting of schists, greenstone, and quartzites.

Location J. A., Killarney, Algoma District, Ont. } .... *Ontario Bureau of Mines.*

195. Hæmatite.

Belmont Township, Peterborough Co., Ont. } .... *Geological Survey.*

143. Hæmatite.

143*a*. "

143*b*. "

143*c*. "

Madoc Township, Hastings Co., Ont. .... *Geological Survey.*

142. Hæmatite.

From a deposit known as the "Wallbridge mine." The ore is a finely granular hæmatite, of a steel-grey colour on fresh fracture. In 1880 the Bethlehem Iron Mining Co. commenced operations here, and after extracting about 35,000 tons abandoned the deposit as exhausted in 1883. Since then the mine was again worked by Mr. Coe, with favorable results, but after the extraction of some thousands of tons work was again suspended.

Welsh Mine, Madoc Township, Hastings Co., Ont. } .... *A. W. Coe.*

173. Soft ochrey hæmatite.

This mine is situated about five miles north of Madoc. The workings consist of an open pit fifteen feet by one hundred feet and forty feet deep. The ore is used at the Hamilton blast-furnace.

Nugent Mine, Madoc Township, Hastings Co., Ont. .... *D. E. K. Stewart.*

174. Hæmatite.

Marmora Township, Lot 13, Con. IX, Hastings Co., Ont. .... *Ontario Bureau of Mines.*

120. Hæmatite.

Location A2, Faraday Township, Hastings Co., Ont. .... *James Vance.*

203. Hæmatite.

Storrington Township, Lot 20, Con. X, Frontenac Co., Ont. *The Equitable Mining and Development Co., Toronto, Ont.*

1001. Hæmatite.

The deposit occurs in the Potsdam Sandstone, which at this place forms the summit of a low ridge of crystalline limestone. The top of the hill is about 100 feet above the lake which is connected with the Rideau Canal, and the iron deposit is in a favorable situation for easy mining and transportation. An analysis of a specimen of this ore made by the Geological Survey Department gave :

	Per cent.
Iron (metallic)	51.120
Phosphorus pentoxide	0.300
Insoluble residue	19.85

Portland Township, Lot 7, Con. X, Frontenac Co., Ont. .... *Ontario Bureau of Mines.*

123. Hæmatite.

124. "

126. "

The deposit from which the specimens were obtained is two miles distant from the Kingston and Pembroke Railway.

Palmerston Township, Frontenac Co., Ont. .... *Geological Survey.*

144. Hæmatite.

Bell Mine, Darling Township, Lanark Co., Ont. .... *James Bell, Arnprior, Ont.*

793. Hæmatite.

Darling Township, Lanark Co., Ont.................... *Ontario Bureau of Mines.*

121. Hæmatite.

Playfair Mine, Dalhousie Township, Lot 1, Con. IV, Lanark Co., Ont. .... *Ontario Bureau of Mines.*

206. Hæmatite.

This mine is about twelve miles distant from Perth. Work was commenced in 1866, the ore being shipped to Cleveland, Ohio. The ore occurs in crystalline limestone, the body varying in width from 5 to 12 feet. Work was discontinued in 1871.

Templeton Township, Wright Co., Que......... *J. O. Hibbard, Detroit, Mich.*

131. Hæmatite.

Harvey Hill, Megantic Co., Que................ *Dr. Jas. Reed, Reedsdale, Que.*

323. Specular iron ore.

Cleveland Township, Lot 21, Range XIII, Richmond Co., Que. .... *Geological Survey.*

234. Hæmatite.

Jacksontown (near Woodstock), Carleton Co., N.B. .... *Geological Survey.*

227. Hæmatite.

The principal locality at which ore has been mined is Jacksontown, situated about three and a half miles from Woodstock and about two miles from the west bank of the River St. John. As seen at this point, the ore beds (portions of which are true hæmatites, whilst others are limonites) are somewhat irregularly interstratified with a series of clay-slates, usually bright-red or brownish-red in immediate proximity to the ore, but elsewhere of a pale-grey colour, and highly inclined. The ore-beds vary in number, and are from six inches to eight feet thick, the average being about three and a half feet. Iron smelting was at one time carried on here.

Nictaux District, Annapolis Co., N.S. .... *N.S. Department of Mines.*

840. Specular iron ore.

These deposits are beds of fossiliferous hæmatite of Devonian age. They are high in phosphorus. An analysis shows :

	Per cent.
Metallic iron	50.09
Phosphorus	.79
Sulphur	.05
Insoluble	18.94

Torbrook, Annapolis Co., N.S. .... *Geo. Holland.*

831. Hæmatite.

The deposit is said to be nine feet wide and can be traced for a long distance.

Torbrook, Annapolis Co., N.S. .... *Nova Scotia Steel Co., New Glasgow, N.S.*

849. Hæmatite.

An analysis of the specimen exhibited gave the following results:—

	Per cent.
Silica	13.00
Ferric Oxide	77.60
Alumina	4.28
Manganese dioxide	0.38
Calcium oxide	1.90
Magnesium oxide	0.35
Titanium	trace.
Barium oxide	trace.
Volatile matter	nil.
Carbon dioxide	nil.
Phosphorus	1.25
Sulphur	0.04
Metallic iron	54.32

Torbrook, Annapolis County, N.S... *Nova Scotia Steel Company, New Glasgow, N.S.*

838. Hæmatite.

The Torbrook hæmatite deposits are very extensive, and considerable mining and development work has been done on them.

Wilmot Station, Annapolis County, N.S. *Torbrook Iron Company, Pictou, N.S*

836. Hæmatite.

From a deposit three miles from Wilmot Station.

Annapolis, N.S. .... *Tremont Iron Company*

837. Hæmatite.

George River, Cape Breton County, N.S. } *M. A. McPherson, George River, N.S.*

811. Hæmatite.

Sydney, Cape Breton County, N.S. .... *E. Moseley, Sydney, N.S.*

805. Hæmatite.

North Sydney, Cape Breton County, N.S. } *John Gresner, North Sydney, N.S.*

813. Hæmatite.

Daiguire, Cuba, West Indies Islands } *Nova Scotia Steel Company, New Glasgow, N.S.*

850. Magnetite.

This exhibit represents the foreign ore used by the company.

Wabana Mine, Newfoundland........ } *Nova Scotia Steel Company, New Glasgow, N.S.*

851. Hæmatite.

This mine is owned by the Nova Scotia Steel Company, and the sample represents the average of 150,000 tons of the ore. The below-given analysis was made in the laboratory of the Nova Scotia Steel Company :

	Per cent.
Moisture, dried at 212 F	0.66
Loss on ignition	2.08
Silica	11.57
Iron oxide	77.67
Alumina	4.55
Manganese oxide	0.08
Lime	1.81
Magnesia	0.44
Phosphoric acid	1.62
Sulphuric acid	0.07
Titanic acid	0.25
Metallic iron	54.37
Phosphorus	0.71
Sulphur	0.03

Limonite and Bog-Iron Ores.

Young America Claim, Wild Horse Creek, East Kootenay, B.C. } *Mr. Sherman, Spokane, Wash., U.S.*

1023. Limonite.

Vaudreuil, Vaudreuil County, Que.............................. *Geological Survey.*

18. Bog-iron ore.

In the seigniory of Vaudreuil, at the confluence of the rivers St. Lawrence and Ottawa, bog-iron ore is found in many places, but appears to be most abundant in Côte St. Charles, where in one place a bed is said to attain a thickness of eight feet. In Ste. Angélique, on what is known as the McGillis property, and also in Ste. Elizabeth, the ore occurs in the form of brownish-black concretions, averaging about three-quarters of an inch in diameter, and containing a large proportion of oxide of manganese.

Burton, Sunbury County, N.B. .... *Geological Survey.*

228. Bog-iron ore.

Londonderry, Colchester Co., N.S.................................*Geological Survey.*

101. Limonite.

Occurs in the slates and quartzites of Cambro-Silurian age, at Londonderry, on the southern slope of the Cobequid Hills. The deposit has an approximately east-and-west course, and has been traced for a distance of more than twelve miles. It is composed of carbonates and oxides of iron. Its width is sometimes two hundred feet, and ore-bodies of fifty feet have been found. The deposit has in places been worked on a large scale.

Analyses of limonites: (Laboratory of the Geological Survey.—See Report for 1873–74).

	Ochrey Limonite. Cumberland Brook.	Compact Limonite. Ross Farm.
Peroxide of iron	79.68	84.73
Protoxide " "	......	trace
" " manganese	2.51	0.23
Alumina	0.63	0.23
Lime	0.57	0.14
Magnesia	0.34	0.14
Silica	3.05	......
Phosphoric acid	0.44	0.19
Sulphuric acid	0.01	0.01
Water (hygroscopic)	0.78	0.33
" (combined)	11.65	11.07
Equivalent to:		
Metallic iron	55.78	58.31
Phosphorus	0.19	0.083

East River, Pictou Co., N.S. .... *Nova Scotia Steel Co., New Glasgow, N.S.*

848. Limonite.

852. " (washed ore).

The limonites of Pictou county occur chiefly as contact deposits, between the Carboniferous limestone above and the Silurian and Cambro-Silurian below. They are frequently botryoidal or stalactitic, and often associated with manganese (pyrolusite and manganite).

The two specimens come from the property worked by the Nova Scotia Steel Co.

Analyses by the company gave the following results:

	No. 848. Per cent.	No. 852. Per cent.
Combined water	10.50	12.40
Silica	8.18	11.25
Ferric oxide	76.30	73.23
Alumina	2.10	1.49
Lime	0.31	0.39
Magnesia	0 21	0.16
Manganese	1.25	0.33
Phosphorus	0.02	0.032
Sulphur	0.06	0.084
Metallic iron	53.41	51.26

East River, Pictou Co., N.S... ....*Mineral Products Co., Bridgeville, N.S.*

856. Manganiferous limonite.

Londonderry, Colchester Co., N.S............................*N.S. Dept. of Mines.*

889. Limonite (brown).

889*a*. Specular ore.

889*b*. Iron ore (brown black).

889*c*. " " (white ore).

889*d*. " " (black vuggy).

889*e*. " " (red ankerite).

Other Iron Ores.

Edmonton, Alberta, N.W.T. ....*Geological Survey.*

298. Clay iron-stone.

Clay iron-stone is very widely distributed in the North-west Territories associated with the coals, lignitic coals and lignites of the Cretaceous

and Laramie formations. Though occurring in some localities in considerable quantities as nodules and nodular sheets, it is not at present likely to be utilized. The quality of the ore is often excellent. The average percentage of iron in several specimens from near Fort Edmonton is 34.98. A specimen from Dirt Hill contained 41.49 per cent. of iron, 1.18 per cent. of protoxide of manganese, .087 per cent. of phosphorus and .068 per cent. of sulphur.

Baie St. Paul, Charlevoix Co., Que.......................... *Geological Survey.*

107. Ilmenite.

The deposit at this place consists of a bed ninety feet thick occurring in anorthosite rock. The ore contains over 40 per cent. of titanic acid, and about 37 per cent. of metallic iron. In some parts of the bed orange-red grains of rutile are disseminated through the ilmenite. In 1873 two blast furnaces were erected near Baie St. Paul by the Canadian Titanic Iron Co., and attempts were made to smelt the ilmenite with charcoal; but although good pig-iron was produced, the enterprise was soon abandoned, owing to the great consumption of fuel. Under favorable circumstances from 190 to 237 bushels of charcoal were required to make a ton of iron, while in some cases over 400 bushels were consumed.

O'Donnell Mine, Kenogami, 18 miles from Chicoutimi, on Lake St. John RR., Que. } *J. G. Scott, Sec'y and Man. Quebec & L. St. J. RR., Quebec, Que.*

1033. Titaniferous iron ore.

1033*a*. " " from a higher bed.

Moisie, Saguenay Co., Que............ } *Messrs. W. S. Thompson and Michaud, Quebec, Que.*

316. Magnetic iron sand.

Many of the rocks of the Laurentian system, which is so extensively developed to the north of the Gulf of the St. Lawrence, contain small disseminated grains and crystals of magnetite and ilmenite, which, on disintegration of the rocks, are gathered together by natural processes of concentration to form important deposits of iron-sands, stretching, in some cases, along the coast for many miles. Some of these are of recent origin, but others belong to the Pleistocene period, and are found as high as one hundred and even two hundred feet above the present tide-level. Mixed with the ores of iron are various proportions of siliceous sand and small quantities of garnet, so that artificial concentration is necessary to fit the material for metallurgical treatment. In practice this has been effected, but in a very incomplete manner, by means of

shaking tables. Dr. Hunt found that a sample of the Moisie sand, that before washing contained 46.2 per cent. of magnetic grains, by washing had its richness increased only to 52 per cent., owing to the high specific gravity of the associated minerals. An analysis of the unwashed sand gave 55.23 per cent. of iron, 16 per cent. of titanic acid, 0.07 per cent. of sulphur, 0.007 per cent. of phosphorus, and 5.92 per cent. of insoluble matter. At Moisie these sands were at one time smelted in a bloomary furnace, but without commercial success. Lately, in view of the high price of iron and modern magnetic processes of separation and briquetting, attention has again been directed to these deposits, and many miles of the Gulf shore have been taken up in concessions with a view to utilizing them.

Londonderry, Colchester Co., N.S. .... *Geological Survey.*

104. Siderite.

The exhibits under the following four headings are conveniently dealt with in association with the iron ores on account of their use in connection with the manufacture of special grades of steel.

The first three might equally be dealt with in the class of minerals applicable to certain chemical manufactures, ores of manganese, chromium and molybdenum being also largely used in the manufacture of such products.

MANGANESE.

Markhamville, King's Co., N.B. .... *Geological Survey.*

247. Pyrolusite.

The deposits are situated near the head of Hammond River, almost forty miles north-east of St. John and eight miles south of Sussex, on the Intercolonial Railway. These mines were first operated systematically in 1864 by Colonel Alfred Markham. The deposits first worked were superficial ones, consisting of ore enclosed as pockets in beds of clay, mingled with gravel and holding boulders of limestone. Later operations were extended to the underlying limestone, but in these the distribution was found to be irregular, leading to great fluctuations in the output and in the profits. The mines are not at present in operation. The ore occurs as crystalline pyrolusite and manganite, or in compact massive, nodular or bedded form, sometimes containing psilomelane, contained in a limestone of grey colour. The limestone carries veins of crystalline calcite, in which masses of pyrolusite are frequently found,

but the principal ore-deposits are lenticular bodies, interstratified with the limestone or replacing some of its beds. The limestone is of Lower Carboniferous age. Much of the ore obtained from these deposits was of exceptionally high grade.

Jordan Mountain, Sussex, N.B. .... *Geological Survey.*

108. Pyrolusite.

The Jordan Mountain Mine is situated on the south-east side of Jordan Mountain. It is distant about seven miles from Sussex Station on the Intercolonial Railway, and about seventeen miles from Markhamville. The ore here is found near the contact of Lower Carboniferous strata with older metamorphic rocks (gneiss and felsite, probably of pre-Cambrian age). The appearance of the deposit is that of a lenticular mass, conformable to the bedding, rather than that of a vein. The ore of the main mass is mostly a fine-grained pyrolusite, of a massive character mixed with manganite. Two analyses show:

(1) Manganese binoxide	86.08	per cent.
Iron oxide	0.87	"
Silica	2.86	"
Metallic manganese	54.57	"

Analysis by Prof. R. B. Wilson, Baltimore.

(2) Manganese	57.37	per cent.
Silica	0.23	"
Phosphorus	0.015	"
Sulphur	0.61	"

Analysis by Pennsylvania Steel Co.

Dawson Settlement, Albert Co., N.B. } *Mineral Products Co., Bridgeville, N.S.*

857. Bog manganese.

857*a*. " " dried.

857*b*. " " briquettes.

857*c*. Ferro-manganese.

857*d*. Spiegeleisen.

This deposit is situated some five miles and a half from the town of Hillsborough, on the slope of a hill. The ore is found as a very fine black powdery deposit consisting essentially of manganese oxide, under a thin covering of vegetable matter, usually not more than a few inches in depth. The thickness of ore varies from a few inches to thirty feet, over an area of eighteen to twenty acres.

The average composition of the ore from twelve analyses is as follows:

Metallic manganese	45.81	per cent.
" iron	9.95	"
Sulphur	.03	"
Phosphorus	.05	"
Silica	5.36	"

The ore being in a pulverulent condition, has to undergo a briquetting process, in which condition it is used for the manufacture of spiegeleisen and ferro-manganese.

East River, Pictou Co., N.S. .... *Mineral Products Co., Bridgeville, N.S.*

855. Manganite.

Manganese ores are common in Nova Scotia, and are found in the limestones of Lower Carboniferous age near their contact with pre-Carboniferous rocks. In Pictou county, on the East and Middle rivers, manganese is present to a considerable extent as carbonate in some of the limestones, from which it has apparently become concentrated locally as oxidized residue in quantity sufficient for working.

Sydney, Cape Breton Co., N.S. .... *E. Moseley, Sydney, C.B., N.S.*

806. Manganite.

Stellarton, Pictou Co., N.S. .... *Geological Survey.*

248. Manganite.

These deposits are found in the Carboniferous limestones.

Tenny Cape, Hants Co., N.S. .... *Geological Survey.*

246. Pyrolusite.

In Hants county, the ores of manganese occur as pyrolusite with manganite, in nodules, pockets and lenticular masses in the Carboniferous limestones. These deposits are believed to extend for many miles along a contact of the lowest beds of limestone with the underlying unconformable rocks. The ores have been followed to a depth of 75 feet, and the limestones holding them are said to be 300 feet thick. Extensive operations have been carried on at Tenny Cape by means of open workings. One pocket produced as much as one thousand tons of ore. The ore is very high grade and yields from 88 to 95 per cent. of available oxides of manganese.

Tenny Cape, Hants Co., N.S. .... *George E. Boake, Halifax, N.S.*

801. Pyrolusite.

New Ross, Lunenburg Co., N.S. .... *M. T. Foster, Halifax, N.S.*

815. Manganite.

The ore occurs in a vein cutting the granite of the gold-bearing rocks, and has been worked to some extent

New Ross, Lunenburg Co., N.S. .... *Dr. Allan Haley, Windsor, N.S.*

847. Manganite.

New Ross, Lunenburg Co., N.S. .... *N.S. Dept. of Mines.*

826. Pyrolusite.

CHROMITE (Chromic Iron Ore).

The Canadian deposits of chromic iron ore occur in the serpentine belt of the "Eastern Townships" of Quebec, which belt also includes the asbestos mines. The exploitation of these deposits is very recent, and the methods of working them are yet generally primitive. Only the richest ores have been extracted, but with the development of the industry, it may be surmised that mining and concentrating machinery will be brought into use, so as to allow of profitably working the poorer deposits which abound in the district. By referring to the table of analyses it will be seen that the product obtained is quite marketable, even with only the rough hand selection which it undergoes.

The chromite finds a ready market in the United States and in Scotland.

ANALYSES OF CHROME ORES.

Number.	Cr_2O_3.	FeO.	Al_2O_3.	SiO_2.	MgO.	CaO.	Total.
	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.
1	45·90	35·68	3·20	....	15·03	....	99·81
2	49·75	21·28	11·30	....	18·13	....	100·46
3	52·82	....	....	....	....	....	....
4	35·46	....	....	....	....	....	....
5	39·15	27·12	7·00	7·00	16·11	3·41	99·79
6	51·03	13·06	12·16	5·22	16·32	2·61	100·40
7	53·07	15·27	8·01	6·44	16·08	1·20	100·07
8	56·06	21·70	....	1·60	....	....	....
9	65·16	27·36	7·48	....	....	....	100·00

No. 1—Tp. Bolton, Que. G. S. C. Report, Geology of Canada, 1863, p. 504.
" 2—Lake Memphremagog. G. S. C. Report, Geology of Canada, 1863, p. 504.
" 3—Tp. Coleraine, Megantic Co., Que. Coleraine Mining Co. G. S. C. Report, 1894, p. 67 R.
" 4—17, IV. Thetford, Megantic Co., Que. G. S. C. Report, 1887-88, pt. II., p. 56 T.
" 5, 6 and 7—Canadian Mining Manual, 1896, p. 342.
" 8—Coleraine Mining Co. } Chrome Iron in the Province of Quebec, Obalski, 1898.
" 9— " " }

Bolton Township, Brome Co., Que.............................. *Geological Survey.*

296. Chromite in steatite.

Very little work has been done on the deposits of this township, although an opening has been made on Lot 9, Range VII. The serpentine belt in this region is rather considerable and may, perhaps, contain some deposits worth mining.

South Ham, Lot 21, Range II., Wolfe Co., Que. .... *Geological Survey.*

307. Chromite.

South Ham, Wolfe Co., Que........................ *Dr. J. Reed, Reedsdale, Que*

337. Chromite.

Black Lake, Coleraine Township, Lot 19, Range I., Megantic Co., Que. .... *Dr. J. Reed, Reedsdale, Que.*

319. Chromite.

Black Lake, Coleraine Township, Megantic Co., Que. *The Coleraine Chrome Mf'g. Co., Place d' Armes, Montreal, Que.*

351. Chromic iron ore.

351*a, b, c.* " " "

351*d.* " " " concentrated ore.

351*e.* " " " tailings.

Breeches Lake, Wolfe Co., Que..................... *H. Leonard, D'Israeli, Que.*

756. Chromite.

Little Lake Francis, Megantic Co., Que. *Messrs. H. Leonard & A. Labrecque, D'Israeli, Que.*

757. Chromite.

TUNGSTEN.

Marlow Township, Lot 1, Range VII., Beauce Co., Que. .... *Geological Survey.*

105. Scheelite.

This mineral occurs in a vein of quartz about one foot wide, accompanied by its decomposition-product, tungstic acid. An analysis of the scheelite made in the laboratory of the Survey shows it to contain 79.9 per cent. of tungstic acid, or within 7 per cent. of the theoretical quantity. No attempt has yet been made to work the deposit.

Emerald, N.E. Margaree, C.B.....................*A. C. Ross, Cape Breton, N.S.*

814. Wolframite in quartz.

MOLYBDENITE.

King Mine, Grand Prairie, B.C.........................*Messrs. Angus & Mitchell.*

632. Molybdenite.

Harcourt Township, Lot 3, Con. I., Haliburton Co., Ont. } *Canadian Land and Immigration Co. of Haliburton.*

321. Molybdenite.

Ross Township, Lot 22, Con. II., Renfrew Co., Ont. } ....*Geological Survey.*

21. Molybdenite in quartz.

This deposit consists of a vein of quartz about two feet wide, running with and enclosed by gneiss, with molybdenite distributed abundantly through the quartz in crystals, which are generally coated with molybdite, the yellow oxide of molybdenum.

Alleyn Township, Lot 1, Range II, Pontiac Co., Que. } ....*Geological Survey.*

25. Molybdenite.

Egan Township, Lot 69, Range IV., Wright Co., Que. } ....*Geological Survey.*

22. Molybdenite in quartz.

22*a*. " " (separated).

This deposit occurs in a pyroxene rock in association with iron-pyrites and where weathered shows much molybdite.

Island No. 12, Paint Hills, East Coast of James Bay, Ungava District. } ....*Geological Survey.*

1031. Molybdenite.

New Ross, Lunenburg County, N.S................*N. S. Department of Mines.*

911. Molybdenite.

II.

MATERIALS USED IN THE PRODUCTION OF LIGHT AND HEAT.

In Nova Scotia there are several extensive areas of bituminous coal which have been mined for many years. In New Brunswick is a small productive area with thin seams, also bituminous. The above are all in rocks of Carboniferous age. In the Northwest Territories very large tracts of the prairie country are underlain by coal-beds, varying in quality from lignites in the east to bituminous coals in the west, as the foot-hills of the Rocky Mountains are approached.

In the mountain region itself is a coal-basin yielding anthracite and steam coal, at Banff and Canmore. Across the watershed in British Columbia is the Crow's Nest Pass field, now being opened up, and on Vancouver Island are important collieries that have been worked for many years. Besides these, this province has numerous occurrences of coal in the Tertiary rocks of the interior, most of these being lignites, but some becoming true bituminous coals. There are also many known occurrences of coal in Cretaceous rocks in other parts of British Columbia, not yet accessible economically. Anthracite, bituminous coal and lignite occur on the Queen Charlotte Islands, but are not at present worked.

It will be noted that all the known coals and lignites from Manitoba westward are either Cretaceous or Tertiary in age, while no coals of a later period than the Carboniferous proper occur in the Maritime Provinces of the east. It is important also to note that both the Atlantic and Pacific coasts of Canada are well supplied with good coal.

Anthracite Coal.

Anthracite Mine, Anthracite, Alberta, N.W.T............ *Geological Survey.*

9. Anthracite coal.

The Anthracite mine is situated in the Cascade coal-basin. The coal at this place, owing to great local alterations, has become an anthracite, although of Cretaceous age. The capacity of the colliery is about 150 tons a day.

A recent analysis by the Geological Survey shows it to have the following composition :

	Per cent.
Hygroscopic water	1.04
Volatile combustible matter	9.15
Fixed carbon	87.18
Ash	2.63
	100.00

Bituminous Coal and Lignite.

In character the Cretaceous and Tertiary coals of British Columbia range from anthracite to lignite, showing that the grade depends on their degree of metamorphism rather than on their geological age. Three principal coal-fields, all of Cretaceous age, may be mentioned, being those that are at present largely worked, as follows:—

The Nanaimo field.

The Comox field.

The Crow's Nest Pass field.

Southfield Colliery, Nanaimo, B.C. } *New Vancouver Coal Mining and Land Co., Ltd., Vancouver, B.C.*

374. Bituminous coal, from Southfield.

585. " " " "

585*a*. " " No. 1 shaft.

The Nanaimo field, from which the above specimens are derived, is situated in the south-eastern part of Vancouver Island. Its area has been estimated at about 200 square miles. Two seams, at least, of workable thickness are known, but the measures being much folded and cut up by faults, it is very difficult to correlate the beds in the various parts of the field.

The product of both this and of the Comox areas is largely exported to California and to some extent to various other Pacific ports, where it competes successfully with coals produced in the United States or brought from New South Wales, England, etc.

The New Vancouver Coal Mining and Land Co. was organized in 1862 and reorganized in 1889. The Southfield colliery is situated five miles from Nanaimo. The seam worked varies from six to twelve feet in thickness. The system of working is pillar and stall.

The No. 1 shaft is on a seam five to twelve feet in thickness. The workings of this colliery are under the waters of Nanaimo harbour and beneath the surface of Protection Island.

A specimen from the Wellington colliery, analysed in the laboratory of the Geological Survey, gave the following results :

	Per cent.
Hygroscopic water	2.75
Volatile combustible matter	30.95
Fixed carbon	59.72
Ash	6.58
	100.00

Union Mine, Comox, B.C. ... *Union Colliery Co. of B.C., Ltd., Comox, B.C.*

1151. Coal.

1151*a*. Coke.

The Comox field is situated to the north-west of the Nanaimo field, from which it is separated by the intervention of crystalline rocks. The Comox area has probably a greater extent of productive measures than the Nanaimo field. A minimum estimate of its area has been given at 300 square miles.

In a section on Brown river almost the entire thickness of the productive measures is exposed, amounting to 740 feet. In this section nine seams occur, with an aggregate thickness of 16¼ feet. At the Union mines a section of 120 feet reveals ten seams, aggregating 29¼ feet, the thickest being 10 feet.

The following is an analysis by Dr. B. J. Harrington :

	Per cent.
Hygroscopic water	1.70
Volatile combustible matter	27.17
Fixed carbon	68.27
Ash	2.86
	100.00

North Thompson River, B.C. ... *Messrs. Sarel & Young, Kamloops, B.C.*

647. Coal.

From the North Thompson Coal Mine, forty-five miles north of Kamloops. The coal at this place was first described in the report of the Geological Survey for 1877-78. It is bituminous in quality, but occurs in thin seams only so far as yet known. It is of Tertiary age.

Michel Creek, Sparwood Station, B.C. } *Crow's Nest Pass Coal Co., Fernie, B.C.*

722. Bituminous coal, from the eight-foot seam.

Coal Creek, B.C.......................... } *Crow's Nest Pass Coal Co., Fernie, B.C.*

723. Bituminous coal, from the six-foot seam.

Fernie, B.C.............. .... } *Crow's Nest Pass Coal Co., Fernie, B.C.*

724. Coke.

The Crow's Nest Pass field is the most easterly of the British Columbia coal areas. It has recently been made available by the construction of a line of railway through it, permitting coal and coke to be delivered at the smelting centres of the Kootenay districts at greatly reduced rates. Development work has been carried on rapidly and some coal was shipped in 1898.

These coals were first described by Dr. G. M. Dawson in the Annual Report of the Geological Survey of Canada for 1885. In his report on the Mineral Wealth of British Columbia (Annual Report G.S C., 1887–88) he describes them as follows:—"The Cretaceous basin or trough in which they occur is somewhat extensive and resembles in general character those which occur on the opposite side of the Rocky Mountains watershed, beyond the limits of British Columbia, in one of which the Cascade (Banff) anthracite is included. The age of these Cretaceous rocks appears to be nearly the same as that of those of the Queen Charlotte Islands. By the prospecting work which has lately been executed in the Crow's Nest Pass the existence of no less than fifteen workable seams is said to have been determined, two of which are reported as 14 and 20 feet respectively, in thickness."

Dr. Selwyn further describes this field, in his summary report for 1891. In two different sections he found the thickness of workable coal comprised in a number of superposed seams, to aggregate 132 and 148 feet respectively.

The Company now operating this area, the Crow's Nest Pass Coal Co., has its principal colliery at Coal Creek. There are two seams worked at this place, six feet and six and a half feet, respectively, in thickness. A large plant of coking ovens has been erected at Fernie, at the junction of Coal Creek and Elk River.

Cliff Creek, Yukon River, Yukon District, N.W.T. } *North American Transportation Co., Yukon, N.W.T.*

680. Lignite coal.

This deposit occurs in sandstones and shales appraently of Laramic age. The seam is stated to be about 15 feet thick and is being worked.

In the Northwest Territories, the coal measures occur in rocks of Cretaceous age or in the Laramie, which may be regarded as transitional to the Tertiary. The quality of coals produced by these measures grades from lignite or brown coal to anthracite, partly in accordance with age, but chiefly in correspondence with the amount of change to which they have been subjected by metamorphic agencies. Several coal-bearing districts have been recognized throughout the region, being those places in which some work has been done, either of a prospecting nature or for local wants, but the coal-fields are much more extensive. In three districts, however, coal-seams are systematically worked, and extensive and well-equipped collieries have been opened on them. These are :—

The Cascade coal basin, western Alberta.

The Belly River district, southern Alberta.

The Souris River district, eastern Assiniboia.

Canmore Colliery, Canmore, Alberta, N.W.T. .... *Geological Survey.*

10. Coal.

This colliery is in the Cascade coal-basin, on a part of the Bow River valley underlain by Cretaceous coal-bearing rocks. The basin or trough has a length of about thirty miles and a total area of some sixty square miles. It is traversed by the main line of the Canadian Pacific Railway. Some of the seams have been converted to anthracite, although most of them are bituminous in character. At "Marsh's mine," near the south end of the field, are two seams, one about fifteen feet and the other eight feet thick. At Canmore there are three seams, of four, twelve, and sixteen feet respectively. At Anthracite three seams are worked, two of a thickness of four feet each and one of three feet.

The measures in this field are often faulted and the seams dip to the south-west at inclinations varying from 15° to 60°.

The field was first opened by the Canadian Anthracite Coal Co. in 1886, working collieries at Canmore and Anthracite. In 1891 these two mines were leased to the H. W. McNeil Co. for a period of ten years. The mine at Canmore is equipped for an output of 600 tons a day, the product being good bituminous coal.

Lethbridge, Alberta, N.W.T............ *Alberta Railway and Coal Co, Lethbridge, Alta., N.W.T.*

681. Coal.

This mine is in the Belly River field, in the southern part of Alberta. The product is a lignite-coal of good quality, non-coking. It finds a ready market in Manitoba, the Northwest Territories, and in the United

States. The seam worked is 4 ft. 8 in. thick. It is reached by three shafts, 300 feet deep and half a mile apart. With the present equipment of the mine a daily output of 1,000 tons could be attained. The company also owns 300 miles of railroad, from Lethbridge to Great Falls, Montana.

The following proximate analysis by the Geological Survey is by slow coking:—

	Per cent.
Hygroscopic water	6.50
Volatile combustible matter	31.59
Fixed carbon	54.36
Ash	7.55
	100.00

An ultimate analysis yielded the following result:—

Carbon	65.30
Hydrogen	4.30
Oxygen and nitrogen	15.65
Sulphur	0.70
Ash	7.55
Hygroscopic water	6.50
	100.00

Souris Valley, Assiniboia, N.W.T. .... *Geological Survey.*

719. Lignite.

The Souris River district is situated in Assiniboia, near the United States boundary, between the 102nd and 103rd meridians. The product of the field is lignite or lignite-coal. The mode of mining is simple, being by means of drifts run into the face of the cliffs forming the sides of the Souris valley. The product is marketed at Winnipeg and Regina, as well as more locally.

	Per cent.
Hygroscopic water	15.11
Fixed carbon	47.57
Volatile combustible matter	32.76
Ash	4.56
	100.00

Newcastle, Queen's Co., N.B. .... *Geological Survey.*

349. Bituminous coal.

The coal field of Newcastle is situated at the head of Grand Lake, Queens county. The coal is of good quality but the seams are thin, the thickest being but 23 inches. Mining operations are being conducted on a small scale, and coal extracted only for local use. The specimen is from the mine worked by O'Leary Bros. This coal, with those of Nova Scotia, is of Carboniferous age.

NOVA SCOTIA.

The following subdivision into fields of the coal-bearing areas in Nova Scotia is generally adopted. The three first-named are, however, those of greatest importance. All are of Carboniferous age.

The Sydney coal-field.

The Pictou "

The Cumberland "

The Inverness "

The Richmond "

Sydney Mines, Cape Breton Co., N.S. — *General Mining Association, Sydney Mines, Cape Breton, N.S.*

887. Bituminous coal.

The Sydney coal-field, in which the Sydney mines are situated, forms the north-east corner of Cape Breton county, and takes in a small portion of Victoria county. It occupies a land area of 200 square miles, about thirty-two miles long by six in width, and is limited on three sides by the Atlantic ocean. The conditions for extraction and shipment are very favorable. There is a remarkable absence of faults, and the coast affords a number of natural harbors. The greater part of the coal-field is hidden beneath the ocean, but the beds can be followed seaward. The aggregate thickness of coal in the workable beds outcropping on the shore, ranges from thirty feet to sixty feet, the individual seams having thicknesses of from three to twelve feet. These dip at low angles from five to twelve degrees, seaward, and appear to have been very little affected by disturbances.

The Sydney field was the first coal-field opened in Canada. As early as 1785 work was done on it by the Government. In 1827 systematic mining was begun by the General Mining Association. This company is now operating the Sydney Mines colliery, and working a seam 5 feet 4 inches in thickness by two shafts, 13 feet in diameter and 690 and 500 feet deep respectively. The yearly output of the mine is about 300,000 tons.

The following is an analysis of a specimen of the coal by Professor How, of Windsor, N.S.

	Per cent.
Hygroscopic water	3.04
Volatile combustible matter	31.14
Fixed carbon	61.50
Ash (reddish-brown)	4.32

According to Mr. G. Buist, manager of the Halifax Gas Works, the yield of gas (8 candles) is 8200 cubic feet per ton (2240 lbs.) of coal.

Caledonia Colliery, Little Glace Bay, Cape Breton Co., N.S. } *Dominion Coal Co., Glace Bay, N.S.*

1162*b*. Bituminous coal.

The Dominion Coal Co. works the Caledonia colliery and eight others, all in the Sydney field. The total output of this company amounts to 50 per cent. of the production of Nova Scotia. It was incorporated in 1893, the authorized capital being $18,000,000, and controls an area of some seventy square miles of coal lands, under a lease which gives a tenure of the mining rights for a period of ninety-nine years.

The collieries of the Dominion Coal Co. are equipped with the most modern machinery, coal-cutting machines and underground endless-rope haulage being installed in all of them. They are not "fiery," naked lights being used in every case.

The Caledonia colliery is situated one mile from Little Glace Bay. The seam worked has a thickness of seven feet, and is reached by a shaft 185 feet vertical depth and two slopes 2300 and 2500 feet long respectively. The yearly output is about 300,000 tons.

Dominion No. 1 Colliery, N.S............*Dominion Coal Co, Glace Bay, N.S.*

1162*c*. Bituminous coal.

This colliery is situated some ten miles from the town of Sydney. The seam worked has a thickness of 8 ft. and a dip of 1 in 14. The output is about 270,000 tons a year.

Reserve Colliery, Bridgeport, N.S. ......*Dominion Coal Co., Glace Bay, N.S.*

Bituminous coal.

1162*e*. Run of mine coal.

1162*d*. Screened coal.

1162*f*. Slack coal.

1162*h*. Sample nut, pea, duff.

1162*i*. Slack and washed slack.

1162*g*. Column of coal.

The Reserve Colliery is the largest producer of the mines of the Dominion Coal Co., the yearly output being over 300,000 tons. The seam worked is 8 ft. 8 in. thick and is worked by two slopes of 5000 feet each.

International Colliery, Bridgeport, N.S. } *Dominion Coal Co., Glace Bay, N.S.*

1162. Bituminous coal.

The seam worked at the International Colliery is nearly six feet thick and is reached by a slope 4000 feet long. The yearly output of this mine is some 130,000 tons.

An analysis of a specimen gave :—

	Per cent.
Volatile matter	34.09
Fixed carbon	62.92
Ash	2.99

The seam dips S. 84° E. at an angle of 5°, and the coal has a regular cleat running N. 75°—80° W.

Hub Colliery......*Dominion Coal Co., Glace Bay, N.S.*

1162*a*. Coal.

The seam worked at this place is about 12 feet thick. The annual production of the mine is about 115,000 tons.

Stellarton, Pictou, N.S......*Acadia Coal Co., Stellarton, N.S.*

886. Bituminous coal.

The Pictou coal-field, which occupies the centre of Pictou county, has an area of productive measures of about 25 square miles. It is eleven miles long with a maximum breadth of three miles. Its extent is therefore small, but some of the seams are of great size, one being 38 feet thick and another 40 feet. The district is remarkably intricate in structure, being cut up by numerous faults of various magnitude, and the productive measures are almost completely surrounded by a girdle of faults.

The field is very well situated for railway connections. It is conveniently divided into three sections, viz., the central or Albion, the western or Westville, and the Vale or eastern.

In the Central four seams have been worked. They are: the Main, 38 feet thick; the Deep, 22 to 40 feet; the Third, 10 to 13 feet; and the McGregor, 13 to 20 feet. The measures containing these seams rest

conformably on the Millstone Grit and are overlain by 1000 feet of shales. The dip of the coal-bearing measures varies from ten degrees to over thirty.

The following analyses are by Professor How, of Windsor College, N.S.:

Main Seam:

	Per cent.
Hygroscopic water	1·48
Volatile combustible matter	24·28
Fixed carbon	66·50
Ash	7·74

Deep Seam:

Hygroscopic water	2·54
Volatile combustible matter	20·46
Fixed carbon	68·50
Ash	8·50

The Westville section is separated from the Albion section by a downthrow fault, proved to be at least 2600 feet. The seams of this section are believed to be equivalent to some of the Albion section.

The Vale section is different in character. It is in the form of a syncline with east and west axis. The thicker and more valuable seams appear on the southern outcrop, where they are worked. On the northern side they thin out.

The Pictou field is worked mainly by two companies. The Acadia Coal Co., which operates the Acadia colliery, the Albion colliery, and the Vale colliery, and the Intercolonial Coal Mining Co., which operates the Drummond colliery. In the air-shaft of this last mine a section shows eighteen feet seven inches of coal, with an included parting of three inches of fire-clay. An analysis of coal from the upper bench, six feet from the top of the seam and directly under the clay parting, gave, according to Mr. Broome:

	Per cent.
Total volatile matter	33.526
Fixed carbon	55.390
Ash (grey)	10.500
Sulphur	0.584

The mines of this district are "fiery." At all the collieries very complete ventilation plants have been put in, and safety lamps are in use.

Vale Colliery, Stellarton, Pictou Co., N.S. } *Acadia Coal Co., Stellarton, N.S.*

910. Coal.

This colliery is situated six miles east of New Glasgow. The seam is reached by a slope 3100 feet long. The Acadia Coal Co. also operates two other collieries in Pictou county.

An analysis of a specimen from the eight foot seam of the Vale colliery gave:

	Per cent.
Hygroscopic water	2.22
Volatile combustible matter	30.23
Fixed carbon	59.70
Ash	7.85

Springhill, Cumberland Co., N.S.... } *Cumberland Railway and Coal Co., Springhill, N.S.*

885. Bituminous coal of various grades.

The Cumberland field is the most westerly of the coal districts of Nova Scotia. There are two coal producing areas. One being at Springhill, and the other situated near the coast about fifteen miles to the west of the first. The latter may be called the Joggins coal-basin.

The exact equivalency of the measures in these two coal-basins has not yet been determined, although they are closely related. The Springhill basin is the more important producer of the two. Three workable seams have been recognized in it. All operations in this basin are carried on by the Cumberland Railway and Coal Co., by three slopes, two of which are 2600 and the third 3000 feet long.

The seams are not very "fiery," but since the explosion of 1891, safety lamps have been used.

The average of four analyses made by the late Mr. E. Hartley gave for the coal of the "Black" seam, which has a thickness of eleven feet:

	Per cent.
Hygroscopic water	1.02
Volatile combustible matter	34.38
Fixed carbon	60.82
Ash (white)	3.78

Joggins, Cumberland Co., N.S....... } *Canada Coal and Railway Co., Joggins, N.S.*

908. Coal.

In the Joggins area several seams of workable thickness, ranging in size from 2½ to 6 feet, are known. The most important producer of this area is the Joggins Colliery, operated by the Canada Coal and Railway Co. The colliery is connected with the line of the Intercolonial Railway by a branch eleven miles long, and with the Joggins wharf, on Chignecto Bay, by a tramway one mile long.

The seam worked shows 4 to 5 feet of coal, with a clay parting in the centre from 1 to 3 feet, making a total thickness of from 6 to 8 feet. This is worked by two slopes, 2700 and 1900 feet respectively, which are connected. Several of the other seams have been opened and worked, some to a considerable extent. At present three or four other collieries, including the Chignecto Colliery, turn out a certain amount of coal.

Chignecto, Cumberland Co., N.S. .... *J. Baird, Chignecto, N.S.*

888. Bituminous Coal.

The two other coal-fields in Nova Scotia, viz., the Inverness coal-field and the Richmond field, are very subordinate in importance. Only at one point are operations conducted on any scale. This is at the Broad Cove Mines, by the Broad Cove Mining Co. The greater part of the work has been put on the construction of railway connection, and the opening of a channel between the mine and the sea. Four levels have been run on the largest seams, and small shipments have been made.

Anthraxolite.

Sudbury District, Ont. .... *Geological Survey.*

245. Anthraxolite.

This deposit of carbonaceous material is situated on Con. I., in the township of Balfour, seventeen miles west of Sudbury, and one mile and a quarter south of the Canadian Pacific Railway. The coaly material occurs in an irregular vein in black slate. The vein is exposed for a length of 70 feet, and is 6 to 9 feet wide. A diamond-drill hole sunk for exploration, found the vein at a vertical depth of 100 feet. The material may be burnt like anthracite, but the residue of ashes is very great. This fact, together with the irregularity in its mode of occurrence, renders it of little economic importance.

Albertite.

Albert Mine, Albert Co., N.B. .... *Geological Survey.*

230. Albertite.

This remarkable mineral, occurring in connection with Lower Carboniferous calcareo-bituminous shales, was first discovered by accident about the year 1850, and has been by some regarded as a true coal, by others as a variety of jet, and by others again as more nearly related to asphaltum. It resembles the latter closely in appearance, being very black, brittle and lustrous, with a broad conchoidal fracture and like

asphaltum is destitute of structure, but differs in fusibility and in its relation to various solvents. It differs from true coal in being of one quality throughout, in containing no traces of vegetable tissues, and in its mode of occurrence, which is that of a vein, and not a bed. The vein occupied an irregular and nearly vertical fissure, and varied from one inch to seventeen feet in thickness. It was mined to a depth of nearly 1500 feet, gradually thinning out as it descended. The accompanying shales are in some portions abundantly filled with the remains of fossil fishes (*Palæoniscus*), and it is not improbable that from these, in part at least, the mineral was derived, existing perhaps at first in a fluid or semi-fluid condition (in which state it has in some instances become the cementing material of conglomerates), and subsequently becoming altered into its present form. Plant remains are almost entirely wanting in the shales. It is estimated that the total amount of albertite raised was not far from 200,000 tons, the price of which varied at different times from $15 to $20 per ton. It was principally used for admixture with ordinary bituminous coals in the preparation of illuminating gas. For this purpose it was admirably adapted, yielding per ton 100 gallons of crude oil, or 14,500 cubic feet of gas of superior illuminating power. When employed with coal it left as a residuum a valuable coke. The vein worked has apparently been exhausted.

Bituminous Shales.

Baltimore, Albert Co., N.B. .... *Geological Survey.*

224. Bituminous shale.

The albertite occurs in veins in these shales. At this place they consist of heavy beds of a very dense, tough and fine-grained character, from dark-grey to black in colour, effervescing readily upon the addition of an acid, and when rubbed, emitting a strongly bituminous odor. Subjected to heat in furnaces erected for the purpose, the shales readily yielded oil, to the amount of, in the case of the best bed, known as the black band, sixty-three gallons to the ton; while the gas yielding capacity is 7500 cubic feet per ton. This material ignites and burns readily.—*Lower Carboniferous.*

McAdam Lake, East Bay, Cape Breton Co., N.S. } *W. N. Young, North Sydney, Cape Breton, N.S.*

884. Coal shales.

Experiments have been made recently on the oil values of some of the shale deposits of Cape Breton county. At McAdam Lake, on the north side of East Bay, the lowest Carboniferous measures rest on Silurian and pre-Cambrian strata. Here a number of beds of black lustrous

shales are found associated with conglomerates, gray shales and sandstones, pitching to the south, away from the older rocks. These black shales are so heavily charged with carbonaceous matter as to be capable of combustion. Explorations have shown a number of beds of this character from two to ten feet in thickness, extending in an easterly and westerly direction.

The following results are stated to have been obtained from working tests.—The distillation in retorts yields beside a little water, a quantity of heavy oils, a little gas and coal available for fuel. The yield of oil is 15 to 20 gallons per ton of 2,000 lbs. In refining this crude distillate, the products may be divided into different varieties according to the market. A convenient division yields 20 per cent. kerosene, 20 per cent. white spindle or sewing machine oil, 40 per cent. heavy lubricating oil, and 20 per cent. pitch. The kerosene does not practically differ from the ordinary American petroleum kerosene. It refines white and is very free burning. White spindle oils are the most costly in the market. There are none, however, in the United States obtained from petroleum so white and so heavy as this from East Bay. The lubricating oil is heavy, while it is as light in color as the heaviest paraffine oil in America. The yield of crude oil is found to be about 6.25 per cent., and the proportions per ton would be :

	Per cent.
Kerosene oil.	1.25
White spindle oil	1.25
Heavy lubricating oil	2.50
Pitch	1.25
Water	5.75
Coke	87.50
Loss, gas, etc.	.50

Lower Carboniferous.

Peat.

Welland County, Ont. .... *Canadian Peat Fuel Co., Toronto, Ont.*

999. Crude peat, cut with spade and drill.

999*a*. " excavated with dredge.

999*b*. Pulverized peat, ready for compression.

999*c*. Peat briquettes.

This company owns a large peat bog in the townships of Humberstone and Wainfleet, on the Welland Canal feeder.

Miramichi Bay, Black Lands, Northumberland Co., N.B. .... *Geological Survey.*

760. Peat.

Peat bogs are of common occurrence in New Brunswick, and sometimes cover large areas. In Northumberland county several peat bogs have been noticed, the two most extensive ones covering areas of some seven square miles each. These deposits, together with those in Quebec and Ontario, have lately attracted considerable attention in connection with the manufacture of moss-litter, but no great quantity of this has yet been produced.

Petroleum.

Athabasca River, Athabasca District, N.W.T. .... *Geological Survey.*

322. Maltha or natural tar.

268. Tar-sands.

The occurrence of petroleum or "bitumen" on the Athabasca was recorded by Sir Alexander Mackenzie in 1789, and again by Sir John Richardson in 1851. The first-named author states, on page 87 of his narrative, alluding to the forks of the Athabasca, that "at about twenty-four miles from the forks are some bituminous fountains into which a pole 20 feet long can be inserted without the least resistance. The bitumen is in a fluid state; heated it remits a smell like that of sea coal." And Sir John Richardson says: "The whole country for many miles is so full of bitumen, that it flows readily into a pit dug a few feet below the surface."

The deposits occurring along the Athabasca have since been visited by officers of the Geological Survey, and the maltha or mineral pitch has been examined in the Survey laboratory. It appears that, while the pitch is derived from the underlying Devonian rocks, the lower sandy beds of the Cretaceous system have become saturated with this substance, which is now found exuding from them for a great distance along the Athabasca and Peace rivers.—(Report of Progress of the Geological Survey, 1882-84.)

During the last few years some borings have been carried on by the Geological Survey, with the object of proving the presence of oil in the lower portions of the Cretaceous rocks of Athabasca and northern Alberta. The extensive outcroppings of the "tar-sands" along the valley of the Athabasca River would seem to indicate the possibilty of these same beds carrying the lighter oils if tapped in depth, and when removed from the oxidising effects to which the tarry matter at the outcrop is probably due. It is also probable that lighter and more valuable oils may be found in the underlying Devonian rocks.

Three holes have been sunk, at Athabasca Landing, Pelican River and at Victoria on the Saskatchewan. At Pelican River thick tarry petroleum was found at a depth of 750 feet, together with a very strong flow of natural gas. Both the other borings mentioned, intended to penetrate the Cretaceous rocks where much thicker, have had to be abandoned at

depths between 1700 and 1900 feet in consequence of the great difficulty met with from "caving" and pressure of the imperfectly consolidated shales. It is only a matter of time, however, when the possibilities of this promising great northern oil-field will be fully determined.

ONTARIO.

The main productive oil region in Canada is in the county of Lambton, Ont. Surface oil and "gum-beds" were known to exist in the southern part of the township of Enniskillen from the time of the first settlement in western Ontario. In 1860 Mr. Williams, of Hamilton, Ontario, first obtained petroleum by boring in the underlaying rocks at this locality, which was then named Oil Springs. It was soon discovered, however, that the best oil territory was situated a few miles to the north, in the same township, in the vicinity of the present town of Petrolia. All the surrounding country is very level, with a clay surface.

The oil producing region comprises the county of Lambton and the township of Zone, in the county of Kent. Within these limits there are six producing fields, differing much in size and importance, each one representing a separate oil pool. These six fields, with the approximate number of producing wells in each, are given below :—

Petrolia	about	7,000	wells.
Oil Springs	"	1,600	"
Bothwell	"	150	"
Euphemia	"	90	"
London Road	"	70	"
Dawn	"	60	"

The principal fields are at Petrolia and Oil Springs, their respective production approximating 45,000 and 12,000 barrels a month.

The oil is in every case found in the Corniferous limestone of the Devonian system, and the different producing areas represent local dome structures on the main anticlines, which afford reservoirs for the accumulation of oil.

The oil obtained in Lambton county is dark brown in colour, and has a gravity of 31½° to 35° Beaumé. It differs from the oils of Pennsylvania and Ohio, in the United States, in that its sulphur content is much higher. The United States crude oil does not usually contain more than 0.5 per cent. of sulphur, whereas the Canadian oil runs as high as 2½ per cent. This makes it much more refractory to refining, but by modern methods it is claimed that complete elimination can be effected, and the refined oil made equal in quality to the United States product.

Petrolia Field.—The producing area at Petrolia is about 2 miles wide by 12 miles long, in a direction W.N.W. and E.S.E. The oil-bearing strata are encountered at 460 to 480 feet from the surface in the Corniferous limestone, which is found in every case to be overlain by the

Hamilton limestones and shales, the latter affording the impermeable cover required for the accumulation of the oil. The average depth of the wells is 465 to 470 feet, and the strata traversed by the drill are very similar in various parts of the field.

The following log of a well sunk to a greater depth than usual, for the purpose of testing the formation, may be taken as typical of the area :—

	Feet.	
Surface	104	Hamilton.
Limestone	40	
Shale	130	
Limestone	15	
Shale	43	
Limestone	68	
" soft.,	40	Corniferous.
" grey	25	
" "	135	
" hard white	500	Onondaga, including the Oriskany if present.
Gypsum	80	
Salt and shales	105	
Gypsum,	80	
Salt and shales	140	
Total depth	1505	

Oil Springs Field.—The Oil Springs field is about 800 acres in area and is more nearly circular than the Petrolia field. The two are divided by a very distinct synclinal revealed by borings, and this is unproductive of oil. Immediately beneath the drift are found the Portage shales which are underlain by the Hamilton formation. The oil-bearing stratum is struck at about 370 feet from the surface. This was first opened in 1862 and has produced continuously ever since.

Of the minor pools, the Bothwell field, situated in Zone township, Kent county, has at present the largest production, which amounts to some 4000 barrels a month. It runs parallel to the River Thames and is about three miles long by half a mile wide.

The other areas, as far as proved, are small, the production of the largest being only about 600 barrels monthly.

The oil refining industry was formerly carried on at London and Petrolia, by six to ten different companies; these were subsequently merged into two, and in the fall of 1898, these were further consolidated into one company, which took the name of The Imperial Oil Co. The industry has now its seat in Sarnia, a town of about 7000 inhabitants, which lies sixteen miles north-west of Petrolia.

Petrolia, which has a population of some 6000, is, however, the natural centre of the crude oil production interests. The crude oil is gathered and tanked there from the different parts of the field and sent to Sarnia. Practically all the oil is shipped from Petrolia to Sarnia by a pipe line, 16 miles long and three inches in diameter, which is owned by the Imperial Oil Co.

In the fields, the oil is pumped from depths varying from 360 to 470 feet according to the locality, by an engine which works several wells;

the power is transmitted hundreds of feet by means of a very ingenious contrivance of horizontal wooden rods which actuate the walking beams of the pumps. The direction of the transmission of power is changed when needed by horizontal cranks. An engine of 50 H.P. can pump about 175 wells, each producing on an average one quarter of a barrel per 24 hours. The oil is gathered into a central tank which varies in size with the number of wells it receives from. From these small individual tanks it is pumped to a central tank, in Petrolia, by means of pipes laid by a tanking company throughout the producing fields and for the use of which a small charge per barrel pumped is made. From Petrolia the oil is sent to Sarnia by the Imperial Co.'s pipe line. The tanking company has a network of 62 miles of pipe for the purpose of gathering the crude oil from the producers' tanks into the central tank. Their line extends to Oil Springs and Oakdale.

The tanks at Petrolia are simply dug in the blue Erie clay, which is perfectly impermeable. They are lined with pine sticks, for the purpose of preventing the sides from caving in. The reservoirs, of which there are 50, have a storage capacity of 8000 barrels each, or a total capacity of 400,000 barrels.

An idea of the importance of the industry may be obtained from the following figures.

Production of Canadian Oil refineries for the year 1898 :

—	—	Quantity.	Value.
Illuminating oils	Galls.	11,804,667	$1,189,871
Benzine and naphtha	"	1,229,407	120,651
Paraffine oils	"	850,863	114,191
Gas and fuel oils	"	6,399,298	245,101
Black lubricating oils	"	868,957	53,479
Paraffine wax	lbs.	2,522,834	101,972
Total value			$1,825,265

Petrolia, Lambton Co., Ont............*Imperial Oil Co., Sarnia, Ont.*

346. Crude petroleum.

From the Petrolia oil district.

Oil Springs, Lambton Co., Ont ....*Imperial Oil Co., Sarnia, Ont.*

347. Crude petroleum.

From the Oil Springs district.

Bothwell, Kent Co., Ont............................*Imperial Oil Co., Sarnia, Ont.*

345. Crude petroleum.

From the Bothwell oil district.

Sarnia, Lambton Co., Ont.......................*Imperial Oil Co., Sarnia, Ont.*

347*a*. Crude naphtha sour.

347*b*. Waterwhite distillate sour.

347*c*. Common distillate sour.

347*d*. Tar.

347*e*. Crude naphtha sweet.

347*f*. Waterwhite distillate sweet.

347*g*. Common distillate sweet.

347*h*. Gasoline, 90°.

347*i*. " 88°.

347*j*. " 86°.

347*k*. Deodorized naphtha, 76°.

347*l*. " " 74°.

347*m*. " stove gasoline.

347*n*. Benzine, 62°.

347*o*. Waterwhite refined oil, 793.

347*p*. " " 795.

347*q*. Prime white refined oil, 800, Government test 115°.

347*r*. " " 802.

347*s*. " " 805.

347*t*. Light paraffine distillate.

347*u*. Heavy paraffine distillate.

347*v*. Still wax.

347*w*. Treated heavy paraffine distillate.

347*x*. " " " pressed.

347*y*. Paraffine oil finished, 30°.

347*z*. " " 28°.

347*aa*. " " 25°.

347*bb*. " " 22°.

347*cc*. Red oil finished. 27°.

347*dd*. Atlantic paraffine oil finished, 24°.

347*ee*. Yellow neutral oil.

347*ff*. White "

347*gg*. Renown engine oil.

347*hh*. Zone paraffine oil finished.

347*ii*. Summer black oil finished.

347*jj*. Steam refined cylinder stock.

347*kk*. Alaska cylinder oil.

347*ll*. Capital cylinder oil.

347*mm*. Marine valve oil.

347*nn*. Standard wool oil.

847*oo*. Surprise "

347*pp*. Refined wax, melting point 133/36° F.

347*qq*. " " " " 130/33° "

347*rr*. " " " " 128/30° "

347*ss*. " " " " 123/25° "

347*tt*. " " " " 118/20° "

347*uu*. " " " " 112/15° "

347*vv*. Slack wax.

347*ww*. Crude scale wax, melting point 132° F.

347*xx*. Dark Diamond axle grease.

347*yy*. Light " "

347*zz*. Mica " "

347*aaa*. No. 0 Arctic axle grease.

347*bbb*. " 1 " "

347*ccc*. " 2 " "

347*ddd*. " 3 " "

347*eee*. " 3½ " "

347*fff*. " 4 " "

347*ggg*. " 5 " "

Gaspé, Que. — *Petroleum Oil Trust Limited, Gaspé, Que.*

1000. Three samples petroleum.

The eastern part of Gaspé peninsula is formed of Devonian sandstone, underlain by Silurian limestone.

The presence of petroleum has been recognized in the region, in the neighbourhood of anticlines where the limestone outcrops near the surface. Extensive work has been done at different times in the shape of borings in search of oil in commercial quantities, by different companies and notably by The Petroleum Oil Trust. Work is still actively in progress but there is as yet no important output of oil to record.

III.

MINERALS APPLICABLE TO CERTAIN CHEMICAL MANUFACTURES AND MINERAL FERTILISERS.

Pyrites.

No deposits of sulphur are found in Canada, but pyrites is mined in Quebec and is used in the manufacture of sulphuric acid. Besides the exhibits of this class of sulphur ore, below described, there are, in the Eastern Townships district of the province, other deposits of cupriferous pyrite suitable for this purpose. None are at present working, however, other than those represented in the exhibit. Of late years the total production of this mineral in Canada has been about 35,000 to 40,000 tons annually.

Blithfield Township, Lots 1 and 2, Con. I., Renfrew Co., Ont. } ....*E. B. Haycock, Ottawa, Ont.*

1190. Pyrite.

This deposit is said to consist of seven feet of solid iron-pyrites and it is reported to have been traced on the surface for a distance of nearly a mile. Assays of average samples obtained at a depth of 15 feet gave 46 per cent. sulphur.

Eustis Mine, Ascot Township, Sherbrooke Co., Que. } ......*Eustis Mining Co., Eustis, Que.*

184. Chalcopyrite.

Albert Mines, Ascot Township, Sherbrooke Co., Que. } *Nichols Chemical Co., Capelton, Que.*

243. Pyrite and chalcopyrite.

243a. " " "

243b. " " "

The Albert Mine, Ascot Township, Sherbrooke Co., Que. } ....*Geological Survey.*

30. Chalcopyrite.

The Albert Mine is worked by the Nichols Chemical Co., which has chemical and fertilizer works at Capelton, Que. The annual output of the mine is between 30,000 and 40,000 tons, part of which is used at Capelton in the manufacture of acid.

The Eustis Mine is situated on the same vein. Work was begun on this vein more than 35 years ago.

The ore is chalcopyrite, with much iron-pyrites, the yield being 3 to 4 per cent. copper, 45 to 50 per cent. sulphur, and an appreciable value in silver. At present the average annual output of the Eustis Mine is about 20,000 tons. With the exception of the small quantity of ore used at Capelton, all the ore from these mines is shipped to the United States for the manufacture of sulphuric acid and the extraction of the metals.

Magnesite.

Bolton Township, Brome Co., Que................................*Geological Survey.*

270. Magnesite.

Magnesite, or carbonate of magnesia forms rock masses associated with the dolomites, serpentines, steatites and diabase rocks of the Eastern Townships of the province of Quebec. In Bolton it occurs on the east side of the Sutton Mountain anticline in a large bed which resemble, crystalline limestone in appearance. A specimen was found to contains besides small quantities of chromium and nickel, carbonate of magnesia, 59.13 per cent. ; carbonate of iron, 8.32 per cent. ; insoluble (nearly pure quartz), 32.20 per cent.

Celestite or Sulphate of Strontium.

Landsdowne Township, Leeds Co., Ont. ....*Joshua Ligg, Gananoque, Ont.*

202. Celestite.

Bagot Township, Lot 7, Range X, Chicoutimi Co., Que. ....*Geological Survey.*

182. Celestite.

A vein occurs on this lot, said to be two feet wide and to have been traced 200 yards. The deposit is thought to be extensive.

Strontianite or Carbonate of Strontia.

Nepean Township, Carleton Co., Ont.............................*Geological Survey.*

178. Two specimens, strontianite.

Lithia.

Wakefield, Wright County, Que.................... *D. P. McLean, Ottawa, Ont.*

372. Lithia mica (Lepidolite)

An analysis of this specimen showed it to contain 5.44 per cent. of Lithia.

Apatite.

The mining of apatite or "phosphate" in Canada constituted in the past quite a considerable industry, the production in 1892 having amounted to nearly 32,000 tons valued at the shipping point at about $363,000. The larger part of the production came from Ottawa county, Quebec, from some eight large and several smaller mines. The remainder was extracted from deposits in similar Archæan rocks in the district to the south-west of this, in Ontario, lying between Ottawa and Kingston, where one or two large and many small mines were operated.

Since 1893, however, the industry has suffered severely from the competition of other phosphate producing districts in the southern United States and elsewhere. The production in late years has been but a few hundred tons, although 1899 shows a considerable increase over the previous four years with somewhat improved prices. The grade produced from the Canadian mines is high, the "first class" running 80 per cent. and over of phosphoric acid.

Much of the apatite produced of late has been obtained as a by-product in the mining of its associated mineral mica.

North Burgess Township, Lanark Co., Ont. .... *Geological Survey.*

300. Apatite.

High Rock Mine, Portland Township, Labelle Co., Que. .... *Geological Survey.*

29. Apatite (green).

Wakefield Township, Wright Co., Que. .... *Geological Survey.*

32. Apatite (red).

The Blackburn Mine, Templeton Township, Wright Co., Que. .... *Blackburn Bros., Ottawa, Ont.*

355. Apatite crystal.

IV.

MINERAL PIGMENTS.

Iron Ochres.

Portland Township, Frontenac Co., Ont. } *Wm. Caldwell, Rosedale, Toronto, Ont.*

291. Soft hæmatite, suitable for paint.

St. Malo Range, Cap de la Madelaine, Champlain Co., Que. } *Canada Paint Co., Montreal, Que.*

314. Bog-iron ore, natural light shade.

314*a*. " " " " dark "

314*b*. " " " " surface.

314*c*. Powdered light oxide of iron, specimen 314 calcined and ground.

314*d*. Powdered deep oxide of iron, specimen 314*a* calcined and ground.

314*e*. Powdered iron oxide, specimen 314*b* levigated and ground.

314*f*. Light iron oxide paint, specimen 314*c* ground in boiled oil.

314*g*. Deep iron oxide paint, specimen 314*d* ground in boiled oil.

314*h*. Yellow iron oxide paint, specimen 314*e* ground in boiled oil.

314*i*. Graphitic shale, as mined in Carleton Co., N.B.

314*j*. No. 314*i* finely powdered.

314*k*. Canadian graphite paint. No. 314*j* ground in boiled oil.

The deposits of ochre at St. Malo are said to cover an extent of over 600 acres. The layers are interstratified with peat, and have been deposited in an old lake-basin the bottom of which is occupied with shell marl.

These deposits are advantageously situated for working and shipping,

being about two miles north of the St. Lawrence and near the Canadian Pacific Railway. They are at present worked by three companies, and the material is used both for the manufacture of paint and as a gas-purifying agent by gas companies.

The ochres exhibited are said to contain 93 per cent. of oxide of iron, a degree of purity seldom met with. The graphitic shale also is well fitted for the manufacture of paints, being when powdered very opaque. Great covering power and durability is claimed for it.

Baryta.

Deposits of this mineral are known to occur at a number of places in Canada, but it has been produced chiefly in Nova Scotia and Ontario. None of the deposits have been worked continuously, however, and the output of the country has varied much in different years.

The mineral has been shipped in the crude state unground, the chief deposits worked being those at Five Islands, Colchester Co., and at Lake Ainslie and Mabou in Inverness Co., Nova Scotia, and in Ontario at McKellar Island, Thunder Bay district.

Hull Township, Lot 7, Range X., Wright Co., Que. ....*Geological Survey.*

15. Barite.

The barite at this place occurs in a vein of from four to six inches wide.

Lake Ainslie, Inverness Co., N.S..... *Messrs. Henderson and Potts, Halifax, N.S.*

808. Barite.

809. " crushed.

This deposit is extensive, and is worked intermittently, according to the demand.

Middle Stewiacke, Colchester Co., N.S. *Messrs. Henderson and Potts, Halifax, N.S.*

807. Barite.

V.

SALT AND BRINES.

Brine springs occur in several parts of Canada, but the only salt-producing industry of any importance is confined to Ontario.

In Manitoba a little salt has at times been produced locally from some of the springs which occur around the shores of Lake Winnipegosis, where the brine, although weak, is in many cases in large quantities.

In the Mackenzie River basin similar salt springs have been noted north of Athabasca Lake.

In both cases the salt appears to be derived from small pockets and isolated crystals of the mineral, disseminated throughout a porous dolomite of Devonian age.

The real salt industry of Canada is located in Ontario, some ten or fifteen firms operating at various points, in the counties bordering the south-eastern shores of Lake Huron, and along the St. Clair and Detroit rivers from Kincardine to Windsor.

The mineral is produced by pan evaporation of brines, pumped from wells drilled to the underlying salt beds of the Onondaga rocks, which are of Upper Silurian age.

From a boring made by Mr. Attrill at Goderich, in 1876, to the depth of 1517 feet, with a diamond-drill, the existence of six beds of rock salt, has been ascertained as follows :—

	Thickness.	Distance from surface.
Rock Salt......1st bed.	30 feet 11 inches.	1027 feet 11 inches.
" ......2nd "	25 " 4 "	1085 " 4 "
" ......3rd "	34 " 10 "	1127 " 0 "
" ......4th "	15 " 5 "	1223 " 0 "
" ......5th "	12 " 6 "	1243 " 6 "
" ......6th "	6 " 0 "	1385 " 0 "

These salts are not all alike in purity. The first is scarcely suitable for mining, while the second is remarkably pure, and the third approaches it in this respect. The latter two beds, which together measure over 60 feet, are separated from each other by a layer of less than 7 feet of rock and for practical purposes may be regarded as one great workable mass.

Dr. Hunt, who analysed the salt, calculated that the yield from the

best white layer, which is ten and a half feet thick, would be 880,000 bushels to the acre.

In 1898 the production of salt in Canada amounted to 57,142 tons, representing a value of $248,639. The amount manufactured is limited only by the demand.

The New Brunswick occurrence, described later, has a local interest only.

Windsor, Essex Co., Ont........................ *Windsor Salt Co., Windsor, Ont.*

762. Coarse salt.

762*b* Cheese "

762*c*. Butter "

762*d*. Table "

762*e*. Fine "

The Windsor Salt Co. is the largest salt producer in Canada. The first well was sunk in 1892 and reached a very good deposit of salt, when the erection of works was begun. In 1896 another boring was sunk, which reached a depth of 1672 feet, proving the existence of four salt beds, which aggregate a thickness of 392 feet, the lowest, which is the thickest, being alone 250 feet. The works of the Windsor Salt Co. are very well equipped with the latest machinery, the evaporation being made in large vacuum pans, and are well situated for shipping facilities, both by railway and water.—*Onondaga.*

Wingham, Huron Co., Ont............ *The Grey, Young & Sparling Co. of Ontario, Wingham, Ont.*

665. Brine.

665*a*. Coarse salt.

665*b*. Fine salt.

The well operated by the above company has a depth of 1185 feet. The brine is obtained from a bed of rock salt 30 feet in thickness reached at a depth of 1090 feet.—*Onondaga.*

Exeter, Huron Co., Ont............................... *Exeter Salt Co., Exeter, Ont.*

666. Brine.

666*a*. Coarse salt.

666*b*. Barrel salt.

666*c*. Fine salt..

This well was sunk in 1881, to the depth of 1251 feet.

The first bed of salt was encountered at 1135 feet.

In this establishment the open pan process is exclusively employed.—*Onondaga.*

Parkhill, Middlesex Co., Ont. .... *Parkhill Salt Co., Parkhill, Ont.*

667. Brine.

667*a*. Coarse or shippers' salt.

667*b*. Fine salt.

The well at Parkhill was sunk in 1884 to a depth of 1300 feet, passing through two beds of rock salt.—*Onondaga.*

Clinton, Huron Co., Ont............*Messrs. R. and J. Ransford, Clinton, Ont.*

668. Brine.

668*a*. Dairy salt.

668*b*. Fine salt.

668*c*. Table salt.

There are two beds of salt in the section of this well, one of these at a depth of 1151 feet and the other at 1214. The well is 1239 feet deep.—*Onondaga.*

Sussex, Kings Co., N.B.................. { *Messrs. G. N. and C. J. Hendricks, Plumweseep, N.B.* }

266. Salt.

From the parish of Cardwell, Plumweseep. The salt is manufactured from the brine of the salt springs of Sussex. These salt springs are derived from the Lower Carboniferous rocks. Operations for the manufacture of salt in this vicinity were begun more than one hundred years ago. The salt is obtained by evaporation in pans made of boiler-plate. The market for the product is local, the salt being chiefly used in the manufacture of butter, for which purpose it is found to be excellent.

VI.

REFRACTORY MATERIALS AND MINERALS APPLICABLE TO THE MANUFACTURE OF POTTERY, CHINAWARE, ETC.

Asbestus.

The largest known deposits of asbestus in America occur in connection with the serpentines of the south-eastern part of the province of Quebec. Mineralogically they are serpentine-asbestus or chrysotile. The serpentines with which asbestus is associated are found at many places in the belt of Cambrian rocks that extends from the boundary of Vermont to the extremity of the Gaspé peninsula. Economic occurrences of asbestus, so far developed in this area are, however, restricted to two tracts, one comprising the townships of Thetford, Coleraine, Ireland and Wolfeston, on the line of the Quebec Central Railway, and the other being a smaller area to the west of this district, at Danville, on the line of the Grand Trunk Railway, between Montreal and Point Lévis.

The asbestus occurs in veins and veinlets, distributed throughout the rock, and the working is conducted in almost every case in open quarries, some of these being 120 feet deep. The wider veins, producing the best qualities of asbestus, are separated by cobbing from the rock extracted. The residue is then crushed, and the remaining asbestus of shorter fibre is separated by the aid of special machinery. Asbestus also occurs, and is worked in the serpentines associated with the Laurentian rocks north of the Ottawa River.

Danville, Richmond Co., Que.......... } *Asbestus and Asbestic Co., Danville, Que.*

797. Asbestus, crude in rock.

797*a*. " " No. 1 quality.

797*b*. " " " 2 "

797*c*. " No. 1 quality, fiberized.

797*d*. " " 2 " "

797*e*. Fibre, 1st quality.

797*f*. " 2nd "

797*g*. " 3rd "

797*h*. Asbestic wall plaster.

797*i*. " " " (rough).

797*j*. " " " (finish).

797*k*. " " " and asbestic rock.

Thetford Mines, Megantic Co., Que. } *Bell's Asbestus Co., Thetford Mines, Que., and London, Eng.*

1183. Asbestus.

1183*a*. Manufactures of asbestus.

Coleraine Township, Lots 27 and 28, Range A., Megantic Co., Que. } ....*Dr. J. Reed, Reedsdale, Que.*

334. Asbestus fiberized No. 1.

334*a*. " " " 2.

Mica.

The principal mica mining districts of Canada are situated in the western part of Quebec and the eastern part of Ontario, chiefly in the counties of Wright, Labelle, Pontiac and Lanark. In these districts the deposits worked occur in rocks of Laurentian age, the mineral being for the most part the variety phlogopite, the "amber mica" of the trade. The associated minerals are generally pyroxene and apatite in a gangue of calcite or crystalline limestone. In fact, in many cases mines which were formerly worked for apatite or "phosphate" are now operated for the mica they contain, the former mineral being obtained as a by-product. Mica mining is carried on at a few points outside of the districts above mentioned as in the vicinity of Murray Bay, and near the mouth of the Saguenay River in Quebec; also in a few outlying localities in Ontario and at Tête Jaune Cache in British Columbia.

The phlogopite mentioned above constitutes the larger part of the product, but at some of the places mentioned the mineral is muscovite and occurs as a constituent of pegmatite veins that cut the Laurentian rocks. It is then associated with felspar, quartz, etc.

The value of the mica produced in Canada is reported as from $60,000 to $100,000 per annum for the past few years, the returns being, however, incomplete. The figures of production are founded on the export entries and the known home consumption and are probably much under the real amounts.

The principal market is found in the United States. The mica is almost entirely employed for electrical purposes, a small amount being used for stoves, etc. Scrap mica is, however, put to various uses such as the manufacture of non-conducting-boiler-covering. It is also ground and employed as a constituent of lubricants, etc.. in that form.

Bonanza Claim, Yellowhead Pass, Rocky Mountains, B.C. } *Samuel Winter & Co., Moncton, N.B.*

269. Mica (muscovite).

This claim is seven miles south of Tête Jaune Cache. The mica occurs in a vein of coarse pegmatite, the country-rock consisting of blackish micaceous schists and light-coloured gneisses. The vein is described by Mr. McEvoy of the Geological Survey, as about fifteen feet wide where an opening has been made, dipping S. 45° W, conformably with the country-rock. The quartz, felspar and mica, are separated into large masses, the crystals of mica being frequently eighteen inches long and seventeen inches wide. These are found in greatest abundance near the hanging-wall.

Shipments of this mica have been made by means of pack-horses to points on the line of the Canadian Pacific Railway.

Hungerford Township, Lot 27, Con. XII., Hastings Co., Ont. } ....*D. E. K. Stewart, Madoc, Ont.*

177. Mica.

Pike Lake, North Burgess Township, Lanark Co., Ont. } ....*Geological Survey.*

304. Mica (phlogopite).

Cawood Township, Lots 23 and 24, Range III, Pontiac Co., Que. } *Dr. Duhamel and Dr. St. Paul, Hull, Que.*

161. Mica (phlogopite).

This mica is very clear, almost white. The deposit has as yet only been worked to a limited extent.

Hull Township, Lots 15 and 16, Range XV., Wright Co., Que. } *Messrs. Synck & Jourkowski, Gracefield, Que.*

306. Mica (phlogopite).

Vavasour Mine, Hull Township Wright Co., Que. } *Vavasour Mining Association, Ottawa, Ont.*

677. Mica (phlogopite).

The mica here occurs in a number of nearly parallel veins, associated with pink calc-spar, apatite and pyroxene.

Hull Township, Lot 20, Range VII., Wright Co., Que. ......*Joseph Fleury, Kingsmere, Que.*

343. Mica (phlogopite).

The specimen was cleaved off a crystal weighing about 300 pounds.

Wright Township, Wright Co., Que. ....*Rev. Mr. Guay, Gracefield, Que.*

86. Mica (phlogopite).

This mica occurs in a calcite vein of an average thickness of twelve feet. In 1898 the returns from this deposit showed that one hundred tons of mica had been shipped.

Wright Township, Wright Co., Que. ....*W. H. Sills, Ottawa, Ont.*

1003. Mica (phlogopite).

Wright Township, Lot 18, Range VI., Wright Co., Que. ....*J. Draper, Wright, Que.*

181. Mica (phlogopite).

Templeton Township, Lots 16 and 17, Range VIII, Wright Co., Que. *Wallingford Bros. & Co., Ottawa, Ont.*

315. Mica (phlogopite).

This mine began producing in 1892 and has done so steadily ever since. Some very large-size plates are obtained. There is a well-equipped surface plant for hoisting and drilling, and the vein is worked on a large scale.

Templeton Township, Wright Co., Que.......*Blackburn Bros., Ottawa, Ont.*

354. Mica (phlogopite).

The force working at this mine numbers about forty. The mine is well equipped with steam-drills, hoisting-engines, pumps, etc.

Portland Township, Lot 24, Range III., Labelle Co., Que. *The Lily May Co. of Ottawa.—D. L. McLean, Ottawa.*

357. Mica (phlogopite).

Villeneuve Township, Lots 30 and 31, Range I., Labelle Co., Que. ....*W. A. Allan, Ottawa, Ont.*

325. Mica (muscovite).

This mica occurs in a coarse pegmatite vein, which cuts a grayish garnetiferous gneiss. The vein is composed of quartz, mica, orthoclase or microcline and occasionally garnet and tourmaline. Some very large crystals of mica have been extracted. One crystal measured 30 by 22 inches, and a crystal weighing 281 pounds produced $500 worth of merchantable mica. No work has been progress for some years.

Bergeronnes and Escoumains Townships, Saguenay Co., Que. .... *Geological Survey.*

244. Mica (muscovite).

In this district all the mica is of the muscovite variety. Several deposits have been opened and worked at intervals.

Toronto, Ont. .... *Mica Boiler Covering Co., Toronto and Montreal.*

1161. Mica boiler and pipe covering.

The "soft pipe covering" exhibited is made of pure mica leaves crimped and stitched between galvanized mesh wire on the inside and canvas and cardboard on the outside. The "sectional covering" is made of similar flakes of mica held together by a binding material and baked in a kiln. The model exhibited is a small locomotive covered with mats; the model is lagged in the same manner that a full-sized engine would be.

Graphite (Plumbago).

Although graphitic shales occur in various places in Canada, and som of these have been worked for the manufacture of mineral paints, th graphite industry proper is in the neighborhood of Ottawa. One of th six mines worked is situated in Renfrew county, Ont., and the others i the counties of Labelle and Argenteuil, Que.

The deposits all occur in rocks of Laurentian age. In Grenville towr ship, Argenteuil county, the graphite occurs more particularly in th crystalline limestones which form a prominent feature of the gneiss series of the whole district.

The producing graphite-bearing areas of Labelle county are confine to Buckingham township, in the portions of ranges VI., VII. and VII situated west of the Liévre River. Sillimanite gneiss is the prominei feature of the graphite-bearing rocks. This gneiss in places becom thickly impregnated with flakes of graphite, forming a graphitic gneis which can often be worked as a disseminated ore of graphite. Tl graphite is not confined to the gneissic bands, but often extends into tl adjacent rock. Veins of pure graphite also occur cutting the formatio In the case of these veins the associated rocks are the same as foui

with the disseminated ore, viz., rusty gneisses and such igneous rocks as granites and gabbros. The pure vein-graphite sometimes has a flaky structure, but is generally fibrous or columnar, the fibres running across the vein at right angles to the walls. The graphite found in these veins is almost free from impurities. (See Report on Mineral Statistics and Mines for 1897.)

Investigations carried on in the laboratory of the Geological Survey, with a view to ascertaining the suitability of Canadian graphite for the manufacture of crucibles, showed the Canadian mineral to be as incombustible as that of Ceylon and quite equal to it for that purpose.

Four of the mines are equipped with mills for the treatment of the disseminated ores, from which the graphite is extracted by a combined wet and dry process, the rock being crushed and washed, and the dried concentrates further treated by bolting.

Black Donald Mine, Brougham Township, Lot 18, Con. III., Renfrew Co., Ont. } *Ontario Graphite Co., Ottawa, Ont.*

17. Graphite.

This deposit differs from those in Quebec in that it does not occur as there, either in veins with columnar structure or disseminated in gneissic rocks, but consists of a body of largely amorphous graphite in a formation of crystalline limestone and rusty, greyish gneiss, which is cut by numerous pegmatite dykes. The deposit runs with the strike of the formation, shows a thickness of ten feet, and has been traced for some hundreds of feet along its length both away from the shores and under the waters of White Fish Lake.

Waltham Township, Lot 20, Con. VIII., Pontiac Co., Que. } ....*A. McLellan, Ottawa, Ont.*

1146. Graphite (columnar).

Buckingham Township, Lot 19, Range VIII., Labelle Co., Que. } *Walker Mining Co., Buckingham, Que.*

16. Graphite.

16*a*. Three nozzles.

16*b*. Ten crucibles.

16*c*. Four dozen Cosmopolitan stove polish.

16*d*. Two dozen Champion stove polish.

16*e*. Two dozen pencils.

16*f*. Case of lump plumbago.

16*g*. Disseminated graphite.

Grenville Township, Lot 10, Range I., Argenteuil Co., Que. } *Keystone Graphite Co., Grenville, Que.*

327. Graphite.

327*a*. " Prepared K. A.

327*b*. " " K. B.

327*c*. " " K. C.

327*d*. " " K. D.

327*e*. " " K. L.

Whycocomagh, Inverness Co., N.S......*Phillip Waters, Whycocomagh, N.S.*

803. Graphite.

This vein is said to be 18 inches in thickness. It is situated within half a mile of railroad communication.

Christmas Island, Cape Breton Co., N.S. } *Hector MacDougall, Grand Narrows, N.S.*

862. Graphite.

An analysis of a specimen from this deposit by the Dominion Analyst gave: graphitic carbon, 50.23 per cent; rock matter, 43.37 per cent. water, 6.50 per cent.

Fire clay.

Union Colliery, Comox, Vancouver Island, B.C. } *Wellington Mining Co., Vancouver Island, B.C.*

1185. Fire-clay.

In the Union colliery the beds of fire-clay are exploited along with the coal. The fire-bricks which entered into the construction of the coke-ovens of this colliery were manufactured from this material.

Brooklyn, Annapolis Co., N.S.........................*N. S. Department of Mines.*

843. Fire-clay.

Felsite.

Coxheath Hills, Cape Breton Co., N.S............*N. S. Department of Mines.*

909. Felsite.

A series of experiments conducted in the laboratory of the Geological Survey of Canada has shown this material to be well adapted to the manufacture of fire-bricks.

Felspar.

Felspar occurs abundantly as a constituent of the gneisses and granites of the Laurentian which occupy so great an area in eastern Canada. It is only, however, when it is found in the coarsely crystalline pegmatitic masses, or in veins by itself, that the mineral can readily be obtained in sufficient purity for commercial purposes. The low intrinsic value of the product likewise restricts working to places easy of access by water or rail. A number of such deposits have been worked to some extent during late years. The felspar is chiefly used in the manufacture of pottery and glazes, and different varieties of felspar appear to be equally applicable to these uses, but they must be free from grains of iron ore or other impurities. When vitrified the small quantities of iron oxide naturally coloring some of the felspars combine with the silica and its colour disappears.

Cameron Township, Lot 7, Con. A. and B., Nipissing Dist., Ont. ....*Geological Survey.*

164 and 164*a*. Felspar.

South March, Lot 6, Con. II., Carlton Co., Ont. ....*Geological Survey.*

163. Felspar.

163*a*. " vitrified.

The deposit here consists of quartz, microcline, and albite, and is probably extensive, although partly covered by arable land. The distance to South March Station on the C.P. Railway is one mile. Owner, T. M. Woodburn, Ottawa.

Cascades, Wright Co., Que.......................................*Geological Survey.*

43. Felspar.

43*a*. " vitrified.

This deposit has been worked to some extent.

Villeneuve Township, Lot 31, Range I., Labelle Co., Que. .... *Geological Survey.*

350. Felspar.

350*a*. " vitrified.

The felspar at this place occurs in a pegmatite vein exposed for a width of about 200 feet. It is associated with mica, quartz, and tourmaline, coarsely crystallized.

Soapstone (Steatite, Compact Calc).

Bolton Township, Brome Co., Que. .... *Geological Survey.*

44. Steatite, from Lot 26, Range II.

11. " " 17, " V.

The deposits of soapstone of the Eastern Townships occur in association with the crystalline rocks of pre-Cambrian age. Beds of it, varying in thickness from 1 to 16 feet, can be traced for long distances, and are associated with serpentines, dolomites, etc., sometimes replacing one or other of these rocks. It is usually pure, but occasionally crystals of bitter-spar or of actinolite are disseminated through it. In Canada the use of steatite has been limited to the manufacture of roofing cement, but in the United States the uses to which it has been put are very varied, such as the manufacture of fixed tubs for laundries, slate pencils, lubricants, fire-bricks, slabs for electric switch-boards, etc.

Potstone (Compact chlorite).

Bolton Township, Brome Co., Que. .... *Geological Survey.*

14. One slab potstone.

From a band of pure chlorite, having a width of some twenty feet. Great thicknesses of the strata underlying the Eastern Townships of the province of Quebec consist of chloritic slates which appear to occupy a somewhat higher stratigraphical position than the more magnesian strata just mentioned, found in association with the serpentine and steatite. The bands of pure chlorite, however, occur interstratified with the more magnesian strata, some of which are of considerable thickness.

Talc.

Grimsthorpe Township, Hastings Co., Ont. } .... *Geological Survey.*

26. Talc.

Huntingdon Township, Lot 14, Con. XIV, Hastings Co., Ont. } *J. E. Harrison, Bridgewater, Ont.*

165. Talc.

165*a*. " ground.

This deposit of talc was discovered in 1898 and is now worked, the product being shipped to the United States. No great depth has yet been attained, but the vein is reported to be wide and the shaft is in white talc on all sides. The product is equal to the best imported French talc.

VII.

MATERIALS FOR GRINDING AND POLISHING.

Corundum.

Raglan Township, Hastings Co., Ont.................. *Ontario Bureau of Mines.*

373.	Corundum.		
373*a*.	"	crystals.	
373*b*.	"	crystals in rock.	
373*c*.	"	crushed.	
373*d*.	"	"	
373*e*.	"	"	
373*f*.	"	"	S. G. 3.898
373*g*.	"	"	" 3.883
373*h*.	"	"	" 3.883
373*i*.	"	"	" 3.869
373*j*.	"	"	" 3.876
373*k*.	"	"	" 3.831
373*l*.	"	"	....
373*m*.	"	"	" 3.886
373*n*.	"	"	" 3.861
13.	One specimen corundum.		
13*a*.	One case corundum.		

The presence of corundum in ne northern part of Hastings county was really made known in 1896 by Mr. Ferrier of the Geological Survey. The mineral found in Hastings county is essentially pure, but the susceptibility of corundum to alteration and the difficulty of getting rid of the scaly decomposition-products, are hindrances to a more profitable and more general mining and use of the mineral. Throughout the region examined, however, the corundum is, as a rule, fresh and unaltered, and it is believed that the deposits will, if properly handled, furnish a great quantity of material of uniform hardness and purity.

The limit of what may be called the corundum bearing belt extends on the west from Lot 14, Con. XIV Carlow, as far as Lot 25, Con. IV Brudenell. In width it is very variable. The deposits are irregular and usually widely separated from one another. Careful research may reveal other intervening deposits, as the prospecting so far has been by no means exhaustive. In a series of experiments on quantities of 550 and 1250 lbs. respectively, conducted at the Kingston School of Mines, the corundum-bearing rock was concentrated from a content of 18½ per cent. of corundum to 88½ per cent.

A company, incorporated under the name of the Canadian Corundum Company, has just been organized with a capital of $1,500,000, for the purpose of working corundum properties in Hastings and Renfrew counties. They are at present doing some development work, and have erected a mill at a point on the York branch of the Madawaska River.

Toronto, Ont.............................. { *Ont. Bureau of Mines. Manufactured by The Prescott Emery Wheel Co., Prescott, Ont.*

373*o*. and 373*p*. Manufactures of corundum, emery wheels and corundum wheels.

Grey.	Reddish Brown.	Mitred edge.
1— 4 x ½	1— 6 x ⅝	1— 8 x ½
1— 4 x ¾	2— 8 x 1	Square.
1— 4 x ⅝	1— 8 x 1¼	1— 8 x ½
1— 6 x 1¼	1— 8 x 1⅛	Round.
2— 8 x 1	1— 8 x 1⅜	1— 8 x 1
2—10 x 1	1—12 x 2½	1—10 x ½
1—10 x 1¼	1—12 x 1½	1—12 x 1½
1—10 x 1½	Dark Brown.	Bevelled.
1—12 x 1½	1— 3 x ⅛	1—10 x ½
Reddish Brown.	1— 3 x 3/32	1—10 x 1½
1— 3 x ½	1— 3 x ⅜	1—12 x ¾
1— 4 x 1⅝	1— 8 x ⅜	

Several small wheels from 1 to ¼ inches, 3 blocks.

The grey wheels, etc., are made from pure corundum furnished by the Ontario Bureau of Mines.

The reddish-brown and dark-brown, are the regular kinds of emery wheels made by the Company, say ¼ corundum and the rest emery.

Toronto, Ont.............................. { *Ont. Bureau of Mines. Manufactured by The Norton Emery Wheel Co., Worcester, Mass., U.S.*

373*q*, and $373q_2$. Manufactures of corundum, emery and corundum wheels.

No. of Wh,	Diam.	Thick.	Size hole.	No. Emery.	Grade.
1	14	1½	1½	16	Q
1	8	¾	1	40	P
1	8	¾	1	16	Q
2	4	½	¾	40	P
2	3	½	½	40	P
2	2½	⅜	½	40	P
2	2	¼	½	40	P
2	1½	¼	½	40	P
1	Brick				
	1 x 2 x 8			40	P
1	1 x 2 x 8			16	Q
2	½ x 4		Round	40	R
2	½ x 4		Triangular	40	P

This and the following series of manufactured articles have been prepared from Canadian corundum either alone or in combination with emery from other sources. The corundum was furnished by Mr. A. Blue, Director Ontario Bureau of mines at whose instance the experiments have been made.

Toronto, Ont................................ { *Ont. Bureau of Mines. Manufactured by The Hart Emery Wheel Co., Hamilton, Ont.*

$373q_3$. Manufactures of corundum, emery and corundum wheels.

No. of Wheels.	Diam.	Thick.	Purpose.
1	18	2	Castings.
1	12	2	Gen. Pur.
1	12	⅝	Saws.
1	12	½	"
1	12	1	Tools.

Grindstones and Pulpstones.

The grindstones and pulpstones of New Brunswick are obtained from the Millstone Grit formation of the Carboniferous system, which occupies a large portion of the surface of the province. As a matter of fact these materials can be obtained, more or less readily, over almost any part of the area thus occupied. The extraction is determined by demand, and by greater or less accessibility and means of transport.

The cost of transportation to the Canadian markets is a serious hin-

drance to the greater development of the stone industry. Foreign stones are brought into Canada as ballast at a very small cost for freight. The duty imposed by the United States makes the exportation to that country almost impossible.

Most of these stones are also used as building stones.

Newcastle, N.B. .... *C. E. Fish, Newcastle, N.B.*

356. Pulp-stone.

From the quarry at French Fort, near Newcastle. This stone comes from the same quarry as No. 186 (p. 195), which was opened for the production of building stone. Certain beds of the sandstone are well adapted for the manufacture of stones, of which this is a specimen, used in the manufacture of wood-pulp, for paper making. A considerable number of such stones are supplied from this quarry.

Gloucester Junction, N.B.

795. Grindstone.

Cumberland Basin, Joggins Station, Cumberland Co., N.S. ....*R. L. Hibbard, Lower Cove, N.S.*

907. Grindstone.

This quarry is situated about 3½ miles from Joggins Station, on the line of the Canada Coals and Railway Co., and 15 miles from the Intercolonial Railway. The stone is shipped chiefly by water, a great part of it being exported to the New England States.

Infusorial Earth.

Chertsey Township, Lot 15, Range V, Montcalm Co., Que. .... *Geological Survey.*

295. Infusorial Earth.

This deposit occurs at the bottom of a marshy bay of Lac Michel. It extends over an area of three to four acres, and has a thickness of about 16 inches.

St. John, N.B. .... *Geological Survey.*

267. Infusorial earth.

267*a*. " " crude and worked

This material is found in Fitzgerald Lake, St. John county, seven or eight miles from the city of St. John. It was brought to notice through the draining of the lake by the St. John Water Company.

In Nova Scotia there are numerous deposits of infusorial earth. At present two of these deposits are being worked somewhat actively, one being at St. Ann, Cape Breton county, and the other at Bass River Lake. At the former place the deposit, which is in a lake, is some four feet thick. The latter is situated in Colchester county, near Castlereagh, Bass River Lake having been drained for the purpose of working the deposit of infusorial earth

Bass River, Colchester Co., N.S.............*Fossil Flour Co., Bass River, N.S.*

264 and 264*a*. Infusorial earth and "Fossil Flour" made from it.

265 and 265*a*. Infusorial earth and "Tripolite" made from it.

The crude material used by the Fossil Flour Co., in the manufacture of their two grades of product, is mined from the same deposit, the two qualities being selected and separated during extraction. The highest grade is called by them "Tripolite," the lower grade which is salmon-coloured being named "Fossil Flour."

Bass River, Colchester Co., N.S........ *Bass River Infusorial Earth Co., Chas. Nelson, Bass River, N.S.*

900, 900*a* and 900*b*. Tripolite.

St. Ann, Victoria Co., N.S............... *Victoria Tripolite Co., North Sydney, N.S.*

914. One brick tripolite.

Pipe with "Fossil Meal" covering.

Garnet.

Garnet Rock, Wright Co., Wakefield, Que. ....*Geological Survey.*

342. Garnet rock.

Beds or deposits composed of nearly pure garnet in compact or granular form are known in several places in Canada, particularly in the province of Quebec. Limited quantities have been extracted from time to time for use as an abrasive for special purposes.

VIII.

MINERALS APPLICABLE TO FINE ARTS AND JEWELRY.

Although Canada can scarcely be called a gem-producing country, it furnishes a number of stones which are of some value in jewelry and the arts. The exhibit gives a good idea of the possibilities offered in this line. Numerous minerals are found in specimens of well crystallized individuals of such size that they have found prominent places in the cabinets of collectors. As examples may be mentioned zircon crystals up to 15 lbs., titanite crystals up to 70 lbs., also ouvarovites amethysts, etc. (See Report Geol. Sur. for 1887, Part S.)

Cut and Polished Stones.

'arious localities in Canada.. *Geological Survey.*

1152.		Collection of cut stones and agate ornaments.	
1152*a*.	1.	Two Islands, N.S.......	2 Button hooks, agate.
1152*a*.	2.	" "	2 Match boxes "
1152*a*.	3.	" "	1 Blotter, "
1152*a*.	4.	" "	6 Knives, "
1152*a*.	5.	" "	1 Paperweight, "
1152*a*.	6.	" "	1 Ink bottle, "
1152*a*.	7.	Hull, Que..................	1 Match box, jasper.
1152*a*.	8.	Sebastopol, Ont.........	2 Stamp boxes, aventurine.
1152*a*.	9.	" "	5 Cut stones, "
1152*a*.	10.	Partridge Isl'd., N.B..	4 Charms, agate.
1152*a*.	11.	Kick'g Horse Pass, B.C	1 Match box, sodalite.
1152*a*.	12.	Dungannon, Ont.......	1 Obelisk, "
1152*a*.	13.	" "	1 Stick pin, "
1152*a*.	14.	Wakefield, Que.........	3 Cut stones, amazon stone.
1152*a*.	15.	" "	4 Buttons, " "
1152*a*.	16.	Cameron, Ont...........	2 Cut stones, " "
1152*a*.	17.	Buckingham, Que......	1 Paperweight, peristerite.

1152*a*. 18. Grenville, Que.......... 1 Paperweight, serpentine.

1152*a*. 19. Mosaic composed of—
Two Islands, N.S., porcelanite.
Sebastopol, Ont., aventurine.
Cameron, Ont., amazon stone.

1152*a*. 20. Paul's Isl'd, Labrador. 2 Slabs of labradorite.

1152*a*. 21. " " 8 Cut stones "

1152*a*. 22. Wakefield, Que.........13 Cut grossularite.

1152*a*. 23. Harrington, Que .... 5 Cut vesuvianites.

1152*a*. 24. Wakefield, Que .... 7 Cut asteriated quartz.

1152*a*. 25. " " ....12 Tourmalines.

1152*a*. 26. Brudenell, Ont. .... 2 Cut zircons.

1152*a*. 27. Portland, Que........... 6 Cut apatites.

1152*a*. 28. Grenville, Que .... 4 Cut porphry.

1152*a*. 29. Two Islands, N.S....... 6 Cut porcelanite.

1152*a*. 30. Hull, Que.................. 6 Cut brecciated jasper.

1152*a*. 31. Cape Sharp, N.S........ 4 Cut jasper agate.

1152*a*. 32. Digby, N.S................ " "

1152*a*. 33. Cape D'Or, N.S......... 3 Cut agate.

1152*a*. 34. Nicola River, B.C ...... 2 Cut chalcedony.

1152*a*. 35. Burgess, Ont............. 5 Cut perthite.

1152*a*. 36. Calvin, Ont................ 4 Cut peristerite.

1152*a*. 37. Villeneuve, Que......... 2 Cut "

1152*a*. 38. Arisaig, N.S............. 1 Cut dyssyntribite.

Amethyst.

Thunder Bay District, Ont.............................*Griffidus Mann, Ottawa, Ont.*

1034. Amethyst.

Lithographic Stone.

Madoc Township, Hastings Co., Ont............................ *Geological Survey.*

339. Lithographic Stone.

At Marmora the Laurentian rocks are overlain by about twenty feet of brownish-grey and light brownish-buff unfossiliferous compact limestone,

having a conchoidal fracture. Several beds of this would be well suited for the manufacture of lithographic stones, were it not for small imbedded crystals of calcite, which when abundant, render the stone unfit for this use. One of the beds, however, which is two feet thick, and of impalpable grain, appears to afford a lithographic stone of good quality, and has been commended by lithographers who have tried it. The band to which this bed belongs crops out at intervals all the way from Hungerford to Rama, a distance of 100 miles. Stones which may prove to be suitable for lithographic purposes have also been observed elsewhere in Canada, but none of these have been actually used except in an experimental way.

Harris Township, Lots 3, 4 and 5, Range A and 1, Temiscaming District, Que. ....*D. L. McLean, Ottawa, Ont.*

1147. Lithographic stone.

Dungannon Township, Hastings, Co., Ont. ....*Geological Survey.*

70. Sodalite.

Occurs in veins of various sizes. Sodalite takes a good polish and may be used in the fine arts and jewelry.

Hull, Wright Co., Que..*Geological Survey.*

27. Mountain Cork.

Cedar Lake, Saskatchewan District...................................*Geological Survey.*

297. Chemawinite, (" Amber.")

Th sub-fossil resin, found in some abundance on parts of the shores of Cedar Lake, has many of the properties of amber, but has not yet proved to be of economic value.

IX.

MATERIALS APPLICABLE TO COMMON AND DECORATIVE CONSTRUCTION.

Granite, Gneiss, etc.

Nelson Island Quarry, Jarvis Inlet, B.C. .... *Geological Survey.*

190. Granite cube.

The Nelson Island quarry is well situated for the extraction and shipment of stone in blocks of any size. It has so far been worked only to a limited extent, the stone having been used in the construction of some parts of the dry dock at Esquimault. The quantity and quality of the granites of the coast region of British Columbia is such, taken in connection with their accesibility, as to suggest that they should become the basis of an important industry, and that they could be quarried, not alone for home use, but for export to other places less favourably situated in respect to building stones.

Nelson Island Quarry, Jarvis Inlet, B.C. .... *B.C. Department of Mines.*

732 Granite cube.

Keefers, C.P.Ry., Fraser River, B.C. .... *B.C. Department of Mines.*

733. Granite.

Excellent grey granites occur in abundance along that part of the Canadian Pacific Railway traversing the Coast Range. These have been extensively employed for purposes of construction along the line Keefers is a siding between Lytton and North Bend stations.

St. Ignace Station, Ont. .... *Ont. Bureau of Mines.*

1006. Granite.

From one mile west of St. Ignace Station on the C.P.Ry., or 150 miles west of Fort William. Large quantities of granite of this character are available at this place.

Pearl River Station, Thunder Bay, Ont. ……………… *Ont. Bureau of Mines.*

1011. Granite cube.

Point Brulé Harbour, East Coast Lake Superior, Ont. …………………… *Geological Survey.*

768. Base of grey granite.

769. Cube of red granite.

Large quantities of granites of the character represented by these specimens may be obtained on this part of the coast of Lake Superior, but no quarries have yet been opened.

Kingston, Ont. ……………………………………………… *Geological Survey.*

110. Column, granite.

111. Column and base, gneiss.

The quarry from which this stone was taken is situated on the east cove of Kingston harbour. The stone obtained varies somewhat in character, sometimes being gneissic in structure, but elsewhere being quite massive. The color is generally some tint of red with grey wavy markings. It is peculiarly adapted for decorative purposes, and is in demand for building and monuments.

Gananoque, Leeds Co., Ont. ………………………………… *Geological Survey.*

150. Granite cube.

The quarry is situated on an island opposite the village of Gananoque. The area of the island being almost twenty acres. The stone consists of red felspar, bluish-grey quartz often slightly opalescent, a small quantity of greenish black or black hornblende and a little mica. The facilities for shipping are all that could be desired, as vessels can load direct from the quarry.

Gananoque, Leeds Co., Ont. ………………………………… *Geological Survey.*

669. "Black granite," anorthosite.

Ramsay Township, Lanark Co., Ont............................*Geological Survey.*

8. Epidotic gneiss.

Grenville Township, Argenteuil, Co., Que....................*Geological Survey.*

4. Syenite cube.

5. " "

These syenites occur in association with the Laurentian rocks. They have for the most part a reddish tinge due to the colour of the felspar. The rock splits readily, and dresses with comparative ease. Excellent stone may be obtained at this place.

St. Philippe, Grenville Township, Argenteuil Co., Que. } *J. Brunet, Cote des Neiges, Montreal. Que.*

1028. Granite card receiver and pedestal.

This granite has of late been employed to a considerable extent, it works easily and takes a good polish.

Mount Johnson, Iberville Co., Que. ....*Geological Survey.*

57. Syenite, black and grey.

Mount Johnson is one of the eruptive masses that stand out on the plain of the St. Lawrence south of Montreal.

Stanstead Township, Stanstead Co., Que. } .... *Geological Survey.*

3. Two bases, granite.

In the township of Stanstead grey granite occurs in abundance, occupying in one place an area of six square miles. It is comparatively free from pyrites, and is but little affected by the action of the atmosphere. It takes a fine polish, is easily worked, and in many localities may be obtained in blocks of any required size. It has been used in public buildings in the city of Sherbrooke, in the Eastern Townships Bank of that place, and in the fine wall surrounding the grounds of the Parliament Buildings at Quebec. It is much in demand for monuments.

Rivière à Pierre, Portneuf Co., Que.......................... *Quebec Government.*

193. Granite.

A grey hornblendic granite is found in the cuttings of the Quebec & Lake St. John Railway, from Riviere a Pierre to Meguick. It has been quarried for building-stone. It is valuable for heavy foundations and for exposed walls.

Jean Voyer's Quarry, Rivière à Pierre, Portneuf Co., Lake St. John Ry., Que. } *J. G. Scott, Sec. and Man. Que. & Lake St. John Ry., Que.*

1035. Granite, fine and coarse.

Chicoutimi, Saguenay Co., Que.................................... *Geological Survey.*

103. Anorthosite, granite.

Anorthosite is a variety of gabbro, very rich in felspar, and often almost entirely composed of plagioclase felspar. This rock occupies great areas in the Laurentian of several parts of the Dominion, which are now easily accessible by means of recently constructed railways. Numerous large boulders are also scattered over the country in the vicinity of Grenville, St. Andrews (Que.), and other places, more especially along the Ottawa and St. Lawrence. In some localities, as for example in the township of Rawdon (Que). the rock is fine grained and foliated, while elsewhere, as in the townships of Abercrombie and Morin, where it forms large mountain masses, it consists of a compact base, composed chiefly of labradorite, containing imbedded cleavable masses of the same felspar, sometimes several inches in length, and often exhibiting beautiful opalescent reflections, as well as masses of iron ore, hornblende, etc. The rock has been but little used for building purposes, although its durability certainly recommends it. It is not quite so hard as granite, and takes a fine polish, so that it might in many cases be employed with advantage for decorative construction. Some of these rocks have lately been extensively used for paving stones. There are quarries at New Glasgow, Terrebonne county, north of Montreal.

High Rock Mine, Portland Township, Labelle Co., Que. } .... *Geological Survey.*

69. "Leopard" granite.

Spoon Island, Queens Co., N.B.................................... *Geological Survey.*

301. Grey granite.

Extensive areas of granites and syenites of several different shades of color and varieties of texture occur in New Brunswick. Most, if not all of them, are of intrusive origin, but appear to represent at least two distinct periods of intrusion, the rocks of the one, characterized usually by

grey and dark-grey colours, containing more or less hornblende and not unfrequently magnetic iron ore in disseminated grains, having probably been produced at least as early as the Cambro-Silurian era, while the other, varying in colour from a pale-pink or grey to a tawny-yellow or bright red, and usually more or less porphyritic, is probably of Devonian age.

St. George, Charlotte Co., N.B.................................*Geological Survey.*

118. Granite base to column.

St. George, Charlotte, Co., N.B............*Bay of Fundy Red Granite Works.*

796. Granite monument.

The St. George quarries are situated on the slope of a range of granite hills, about two and a half miles from the town of St. George. Openings have been made at different places, the rock exhibiting considerable variety of colour in passing from one point to another. There is no difficulty in obtaining good blocks of any desired dimensions ; these quarries have been worked for a great many years, the successful operations being due both to the quality of the stone and to the facilities afforded by the great water power of the Magaguadavic River. This stream can be used for the carriage of granite blocks in scows as far as the dressing works, where it changes its character, entering a narrow gorge and breaking into a series of falls. The works are situated on the edge of the ravine, and all the power necessary is derived from the falls. The greater part of the stone, however, is hauled directly from the quarry to the mill, which saves the handling involved in loading and unloading scows.

Bocabec. St. Andrews, Charlotte Co., N.B ....*Geological Survey.*

303. Diorite or "black granite."

A quarry has been opened at this place, in a mass of granitoid rock. This rock is of a highly basic character and dark in colour. It consists of an admixture of Labrador felspar and hornblende with grains of magnetite. It is a handsome stone susceptible of good polish, but tougher to work than the ordinary granites. Compared with that of the St. George quarries, it is said to require about 20 per cent. more labour.

Serpentine.

Serpentines occur in great masses in the Eastern Townships of Quebec, where they are found associated with slates, diorites and sometimes with granitic and schistose rocks. They are interesting as a material for indoor decoration, but serpentine is easily affected by atmospheric agen-

cies and is not therefore adapted for outside work, the polished surface speedily becoming dulled by weathering. Slabs can readily be sawn, which when polished have a rich and pleasing effect and present considerable variety in colour and in markings. The specimens from Orford, Melbourne and South Ham were taken from a band of serpentine which has been traced on the south side of the St. Lawrence, from Potton to Cranbourn, a distance of one hundred and forty miles. In forty miles of this distance it is repeated twice by undulations, giving an additional eighty miles to its outcrop. It is again recognized two hundred and fifty miles further to the northeast at Mt. Albert, in the Shickshock Mountains, and about seventy miles beyond this, at Mount Serpentine near Gaspé Bay. All the specimens of these rocks that have been analysed contain small quantities of chromium and nickel, and the band is associated with soapstone, potstone, dolomite and magnesite. All these rocks occur in large quantities and chromic iron-ore, sometimes in workable amounts, is found in them, as well as in the serpentine. They also contain asbestus (see p. 167), lead, zinc, copper, silver and gold. In 1847, these serpentines, on account of their distribution, were described in the reports of the Geological Survey as altered sedimentary rocks; subsequent observations, however, have shown that in all probability they are of igneous origin.

Serpentines are also found, either pure or in admixture with limestones (ophiolites) in the Laurentian rocks of Quebec, Ontario and St. John, New Brunswick. They are abundant in some parts of British Columbia, but have not been worked.

Calumet Island, Que...*Geological Survey.*

87. One polished block.

This stone consists of dark green serpentine associated with dolomite. Calumet Island is situated in the Ottawa river, about 55 miles above the city of Ottawa.—*Laurentian.*

Melbourne, Richmond Co., Que......................................*Geological Survey.*

2. Two polished columns.

South Ham Township, Wolfe Co., Que..........................*Geological Survey.*

89. Paper-weight, serpentine, dark green.

Melbourne Township, Richmond Co., Que.................*Geological Survey.*

90. Paper-weight, serpentine, dark green, lot I, range VI.

91. " " greyish green, veined with white, lot 22, range VI.

92. Paper-weight, serpentine, dark green veined with grey, lot 20, range V.

93. Paper-weight, serpentine, dark green veined with white.

Brompton Lake, Orford Township, Sherbrooke Co., Que. .... *Geological Survey*

96. Paper-weight, serpentine, green and grey.

97. " " greenish spotted with darker shade.

98. " " green and grey.

Orford Township, Sherbrooke Co., Que........................ *Geological Survey.*

94. Paper-weight, serpentine, dark and light green, from lot 15, range XVIII.

95. Paper-weight serpentine, from lot 6 range XIII.

Shipton Township, Richmond Co., Que........................ *Geological Survey.*

99. Paper-weight, serpentine, dark green and yellowish green.

Stukely Township, Shefford Co., Que........................ *Geological Survey.*

85. Paper-weight, serpentine, dark green.

How Road, near St. John, N.B........ .... *Geological Survey.*

302. Serpentine.

These pale-green serpentines are found associated with the Laurentian limestone. They are susceptible of a fine polish, and have been noticed in several places, but large blocks free from cracks are not easily obtainable.

Quartz-andesite.

Haddington Island, Broughton Strait, B.C. .... *B. C. Department of Mines.*

735. Quartz-andesite cube.

This stone resembles a sandstone in appearance and texture. It is easily dressed, and has been extensively quarried, chiefly for the construction of the new Government buildings at Victoria. An examination of the rock, made in the laboratory of the Geological Survey, shows it to be a quartz-andesite (dacite). A partial analysis made by Mr. Waite

gave :—Silica, 70.5 per cent. ; alumina, with a little iron, 18.7 ; lime, 2.7 ; magnesia, a small quantity undetermined, alkalies undetermined ; loss on ignition, 0.8.—*Tertiary.*

Breccia and Conglomerate.

Ballinac Islands, Gulf of Georgia, B.C...... .... *Geological Survey.*

100. Slab of volcanic breccia.

Breccia and agglomerates of this character, but more frequently green than brown in color, are abundant on Vancouver Island and in vicinity. They probably occur both in the Triassic and the Carboniferous systems.

Bruce Mines, Ont.. *Geological Survey.*

106. One slab jasper conglomerate (polished.)—*Huronian.*

Seymour, Northumberland Co., Ont.. .... *Ont. Bureau of Mines.*

1005. Volcanic breccia.

A considerable exposure of this rock occurs on the property of Mr. David Allan, at Rylstone. Ovate patches of pale-green, purple, pink, drab and other tints contrast with the darker ground-colour.

Hull, Wright Co., Que .... *Geological Survey.*

180. Brecciated jasper (polished.)

Sandstone.

Newcastle Island, Nanaimo, B.C............... .... *Geological Survey.*

102. Sandstone cube.

Among the Cretaceous coal-bearing rocks of Newcastle Island, there are beds of brownish-grey sandstone, which afford excellent material for building and flagging stones. The upper beds are of the best quality ; and it was from one of these that stone was obtained for the construction of part of the San Francisco Mint. Blocks for pillars were taken out, which, after dressing, were twenty-seven feet six inches in length and three feet ten inches in diameter.

Flag-stones with even surfaces, as much as ten feet square, have also been obtained and are easily quarried, and it is not unlikely that some of the measures will afford good grindstones.

Nanaimo, B.C. .... *Geological Survey.*

187. Sandstone.

From an extension of the beds which occur on Newcastle Island.

Gabriola Island, Nanaimo, B.C. .... *B. C. Department of Mines.*

731. Sandstone cube.—*Cretaceous.*

Saturna Island, B.C. .... *B. C. Department of Mines.*

729. Sandstone cube.—*Cretaceous.*

Koksaila, Vancouver Island, B.C. .... *B. C. Department of Mines.*

730. Sandstone cube.—*Cretaceous.*

Salt Spring Island, B.C. .... *Geological Survey.*

185. Sandstone cube.

This stone occurs on the shore of Salt Spring Island, where there is every facility for quarrying and shipment. It is a sandstone of great strength, and has been extensively quarried for the construction of the dry dock at Esquimault.—*Cretaceous.*

Red Deer, Alberta, N.W.T. .... *Geological Survey.*

115. Sandstone cube.—*Laramie.*

C.P.R Quarries, Calgary, Alberta, N.W.T. } *Wm. White, Gen. Superintendent, W. Division, C.P.R.*

113. Sandstone cube.—*Laramie.*

McCallum Quarry, Calgary, Alberta, N.W.T. .... *Geological Survey.*

28. Sandstone cube.—*Laramie.*

Boissevain, Man. .... *Geological Survey.*

37. Sandstone.—*Laramie.*

Grimsby, Wentworth Co., Ont. .... *Geological Survey.*

114. Sandstone cube.—*Medina.*

Chelwer's Quarry, Owen Sound, Grey Co., Ont. .... *Geological Survey.*

55. Mottled greyish sandstone.

Sault St. Marie, Ont. *The Lake Superior Power Co., Sault St. Marie, Ont.*

767. Sandstone.

767*a*. ,,

767*b*. ,,

767*c*. ,,

767*d*. ,,

Sandstones of the character represented by these specimens have been extracted in large quantities during the construction of canals at Sault St. Marie. They are well adapted for building purposes.—*Cambro-Silurian.*

Owen Sound Stone Co., Orangeville, Wellington Co., Ont. .... *Geological Survey.*

54. Sandstone cube.

This quarry, opened in 1890, is situated on the Center Road in the township of Mono, two and a half miles north of Orangeville. The quarry shows three beds of Medina sandstone, aggregating fourteen feet in thickness. The two upper beds are each four feet thick. The stone is of fine quality, greyish in colour, easily worked, and can be obtained of any required size. The third bed is pyritous and hard.—*Medina.*

Caledon Township, Peel Co., Ont. .... *Geological Survey.*

49. Sandstone, fine grained, brown.

50. " " " grey.

There are several important quarries in the township of Caledon, opened on a band of Medina sandstone. The brown variety occurs in beds six feet thick, and is underlain by a greyish sandstone. At places the colour cannot be depended upon, as it changes from brown to grey in the course of a few feet. Some stone has been taken out to be used for the Court House and City Hall and other buildings in Toronto, and also for the Woodstock Court House.—*Medina.*

Pembroke, Renfrew Co., Ont. .... *Geological Survey.*

58. Sandstone.

The quarry is in the vicinity of the Allumette rapids, near Pembroke. The stone occurs in beds from six to twenty inches thick. It is easily worked and although soft, is tough and retains sharp angles. The Pembroke Court House is built of it, and it has been employed for making monuments.—*Chazy.*

Nepean Township, Lots 26, 27, 28, Con. V. and VI., Carleton Co., Ont. .... *Geological Survey.*

671. Sandstone, cube.

671*a*. Crushed sandstone.

At this place a quarry was opened from which was obtained some of the stone used for the Parliament Buildings at Ottawa. The crushed rock may be employed in making concrete, granolithic pavements, furnace lining, etc.—*Potsdam.*

Dudswell Township, lot 15, range V, Wolfe Co., Que. .... *Geological Survey.*

299. Flagstone.

At this quarry the beds have been worked to a depth of over twenty-five feet and are found admirably adapted for flagging purposes. The flags may be obtained of any thickness from two to eight inches. They are for the most part used in Montreal.—*Silurian.*

Beauharnois, Que .... *Geological Survey.*

60. Sandstone, fine grained greyish.

Rockland, Dorchester, Westmoreland Co., N.B. .... *Geological Survey.*

189. Sandstone, cube.

The Carboniferous system, including the Millstone Grit formation occupies a very large portion of the surface of New Brunswick. Sandstone for building purposes, as well as millstones and grindstones, can be obtained from these formations, almost in any part of the area thus occupied. (See under abrasives, p. 179.)—*Carboniferous.*

Newcastle, Northumberland Co., N.B. .... *Geological Survey.*

186. Sandstone, cube.

The quarry near Newcastle was opened in 1885 for the purpose of furnishing stone for the Departmental building at Ottawa, known as the Langevin Block. Since then, the quarry has been kept working, with of course considerable variation in the output according to the demand. The quarry is well situated for shipping facilities. The colour of the upper thirty feet of the stone is a warm, pleasing olive-grey. The stone retains its colour well.—*Carboniferous.*

H. C. Read's Quarries, Wood Point, Westmoreland Co., N.B. .... *Geological Survey.*

311. Brown sandstone, cube.

J. C. Richard's Quarry, Sackville, Westmoreland Co., N.B. .... *Geological Survey.*

312. Red sandstone, cube.

Rockport, Westmoreland Co., N.B. .... *Geological Survey.*

313. Olive sandstone, cube.

The sandstones of commercial importance in Nova Scotia are chiefly obtained from the Carboniferous formation. They are found in the counties of Pictou, Cumberland and parts of Colchester. Numerous quarries are well situated for shipping.

Johnson's Brook, Glenville, Cumberland Co., N.S. .... *Geological Survey.*

188. Sandstone cube.

Wallace, Cumberland Co., N.S. .... *F. C. Dobson, Wallace, N.S.*

829. Sandstone, grey.

Wallace, Cumberland Co., N.S. .... *Wallace Grey Stone Co.*

861. Sandstone, light grey, dressed.

861*a*. " dark " "

The quarry from which this specimen is derived has been worked since 1882. The beds have an aggregate thickness of seventy feet. It is about 150 feet above high-water mark and not more than 600 yards from a good harbour. The beds are horizontal, and for the first fifteen feet from the surface, vary in thickness from four inches to

two feet. Below this there is a massive bed which is from three to eight feet thick. It is divided into rectangular masses by joints from six to fourteen feet apart, which greatly facilitate extraction.—*Carboniferous.*

Pugwash, Cumberland Co., N.S. } *Messrs. McLeod and Embree, Pugwash, N.S.*

859. Sandstone grey, dressed.

859*a*. " brown, "

This quarry is situated on the River Philip, about 5 miles from Pugwash. The seams of stone are from 3 to 7 feet thick, and the face shows about 20 feet of stone.—*Carboniferous.*

Pugwash, Cumberland, Co., N.S........ *W. W. Gammon, River John, N. S.*

858. Sandstone dark brown, dressed.

858*a*. " light " "

Cumberland Basin, Joggins Station, Cumberland Co., N.S. } ...*R. L. Hibbard, Lower Cove, N.S.*

907*a*. Sandstone.

River John, Pictou Co., N.S................ *W. W. Gammon, River John, N.S.*

820. Sandstone, brown, dressed.

There are three quarries worked here, situated at about ¼ mile from the Intercolonial Railway. The stone shows a face of 14 feet in thickness and blocks are cut up to 33 cubic feet, though larger sizes could be cut with larger machinery.—*Carboniferous.*

River John, Pictou Co., N.S......................... *A. Allen, River John, N.S.*

818. Sandstone, dressed.—*Carboniferons.*

Eight-mile Brook, Pictou Co., N.S....*Alex. McPherson. New Glasgow, N.S.*

901. Sandstone.

Eight-mile Brook, Pictou Co., N.S.......*James H. Fraser, Lime Rock, N.S.*

912. Sandstone.

Roofing Slate.

Melbourne Township, Richmond Co., Que. } *New Rockland Slate Co., Montreal Que.*

45 Specimens of roofing slate, 12 x 24 inches.

From the New Rockland Slate Co's quarry in the township of Melbourne. These slates are found in connection with the Cambrian rocks. The quarry was first opened in 1868, and is equipped with machinery for cutting, sawing, etc. The slate cleaves easily, is very free from pyrite, and impervious to water.

Although imperfectly represented in the present collection, very extensive deposits of excellent slate occur in the district south of Montreal, generally known as the Eastern Townships. Several quarries have been opened and worked, and the supply is only limited by the demand.—*Cambrian.*

Limestone (and Marble.)

Nootka, Vancouver Island, B.C.......................*B. C. Department of Mines.*

734. Limestone cube.

There are numerous deposits of limestone on Vancouver Island, the majority being crystalline and some dolomitic. The limestones and marbles appear to be chiefly referable to the Carboniferous and Triassic systems.—*Carboniferous.*

Texada Island, B.C.....................................*B. C. Department of Mines.*

736. Limestone (marble).

The marbles of Texada Island are easily reached by sea, and may be regarded as possessing considerable value for building purposes. Several of these take an excellent polish. They range in color from grey to white and include handsome mottled and clouded varieties. At the present time, however, they are employed almost exclusively for the manufacture of lime.—*Carboniferous.*

Selkirk, Man...*Geological Survey.*

36. Dolomite.—*Trenton.*

The building stones of Manitoba are obtained principally from the cream-coloured dolomites of the Trenton formation or of the Silurian. The former are quarried at Selkirk and are beautifully mottled with light-brown markings. The stone is easily dressed and is used principally in Winnipeg for window copings and decorative cornices, etc. The Silurian dolomite which is quarried at Stonewall is a hard whitish rock used generally for dimension stone in large structures such as foundations and engineering works.

St. Andrew Rapids, Man.. *Geological Survey.*

38. Dolomite.—*Trenton.*

Tyndall, Man.. *Geological Survey.*

35. Dolomite.—*Trenton.*

Lake Manitoba, Man.. *Geological Survey.*

39. Dolomite.—*Devonian.*

Goderich, Huron Co., Ont.. *Geological Survey.*

62. Limestone.

About thirty feet of the rock, in beds from three to six feet thick is exposed in a cliff at Mr. Hyslop's quarry, and large blocks can easily be obtained. The stone is chiefly used for building purposes, it also makes a good lime. The piers of the Maitland bridge at Goderich, and the Goderich jail are built of it.—*Corniferous.*

Priest's Quarry, Guelph, Ont.................................... *Geological Survey.*

52. Dolomite, creamy white.

The Guelph formation, which immediately overlies the Niagara formation in western Ontario, is largely developed in the neighbourhood of Guelph and Galt. It is made up of pure dolomites, which, although generally porous, are nevertheless coherent and well suited for building purposes. At Guelph, where the beds are from four inches to two feet in thickness, there are nine quarries in the immediate vicinity of the town, and large quantities of stone are taken out.—*Guelph.*

Kennedy's Quarry. Guelph, Ont................................ *Geological Survey.*

51. Dolomite, greyish.—*Guelph.*

Puslinch, Wellington Co., Ont.......................................*Geological Survey.*

112. Limestone.—*Guelph.*

Thurlow Township, Hastings Co., Ont.....................*Ont. Bureau of Mines.*

758. Limestone.—*Trenton.*

Walker Bros. Quarry, Thorold Township, Welland Co., Ont. ....*Geological Survey.*

47. Limestone.

The quarry is situated on the line between the townships of Stamford and Thorold. It was opened some forty years ago. There are two bands of limestone. The upper is yellowish-grey and the lower grey. Under the grey is a bed of blue limestone which, however, cannot be worked for want of drainage. Stone from the upper band is used for curbing, street crossings, flagstone, etc., and stone from the lower band for monument-bases, window-sills, etc.—*Niagara.*

Queenston Quarries, Niagara Township, Lincoln Co., Ont. ....*Geological Survey.*

48. Limestone.

These quarries are situated on the Queenston and Grimsby road, two miles west of the village of Queenston. Seven quarries have been opened on the property, all in the strata of the Niagara formation. The several beds differ essentially in colour and texture, from light-grey to blue, and from soft and porous to dense and crystalline.

Below the blue limestone is a bed of dark limestone, which has a proportion of clay in its composition, is from four to six feet in thickness, and is suitable for the manufacture of cement.—*Niagara.*

Gibson's Quarries, Beamsville, Lincoln Co., Ont. ....*Geological Survey.*

46 Limestone.

The quarries are situated on top of the "Mountain," one and a half miles south of the village of Beamsville, Clinton township. They are owned and worked by Mr. W. Gibson. The quarries were opened in 1884. There are two beds of grey limestone, the upper being 7 feet and the lower 8 feet in thickness. The upper bed is usually the best quality.

In some parts of the quarry there is a third bed below these; it is only two to three feet in thickness. Below these is a bed of porous grey limestone, which is rarely of quality fit for use.

The tunnel under the St. Clair River was lined with stone taken from these quarries. They are situated about 200 feet above the level of the station. The stone is carried in cars over a tram road, and reaches the village by gravitation.—*Niagara*.

C. P. Ry. Quarries, Beckwith Township, Lot. 12, Con. XII., Lanark Co., Ont. .... *Geological Survey.*

61. Dolomite.

This greyish-brown dolomite is from the quarries of the Canadian Pacific Railway. It is used for window and door sills and also largely for general building purposes. The stone when first quarried is soft, but hardens on exposure. The round-house at Brockville, as well as bridges and culverts along the line of the Brockville and Ottawa Railway are built of it. Blocks 3 x 3 x 15 feet can easily be obtained.—*Calciferous.*

Ross Quarry, Hawkesbury, Prescott Co., Ont. .... *Geological Survey.*

56. Limestone, dark grey.

Gloucester Township, Carleton Co., Ont. .... *Geological Survey.*

66. Limestone, fine-grained greyish.

Pembroke Township, Lot 12, Con. I., Renfrew Co., Ont. .... *Geological Survey.*

59. Limestone.

The beds are from three to twelve inches thick. The stone is largely employed in the town of Pembroke, and has been used to some extent for bridges. It is bluish-grey in colour and fine-grained. An analysis of a specimen similar to that exhibited gave: carbonate of lime 83.96 per cent., carbonate of magnesia 9.29 per cent., carbonate of iron 0.69 per cent., insoluble 6.06 per cent.—*Chazy.*

Horton Township, Renfrew Co., Ont........................ *Geological Survey.*

116. Limestone cube.

This quarry, situated in Con. II, Lot 2, is called the Renfrew Granite Quarry, probably on account of the fact that the stone is supposed to somewhat resemble granite in appearance. The stone is largely used

for monuments, etc., and is capable of being turned so as to show the finest relief working. The beds, which are extensive, vary from a few inches to several feet in thickness. (See No. 41 p. 205)—*Laurentian*.

Elliot's Quarry, St. Mary's, Perth Co., Ont...................... *Geological Survey.*

53. Limestone, fine grained, grey.—*Corniferous.*

Crookston, Hastings Co., Ont......................... *W. Gibson, Beamsville, Ont.*

772. Limestone cube.

These quarries are operated in the Trenton limestone. They are well situated for shipping facilities, being connected with both C.P.R. and G.T.R. Both steam-drills and hand-drills are used, and the quarry is well equipped with machinery for handling the stone.—*Trenton.*

B. Wright's Quarry, Hull Township, Wright Co., Que. .... *Geological Survey.*

63. Limestone.

These quarries have been extensively worked for a long time, the beds, which are almost horizontal, having been removed over a large area for a depth of 15 feet. Blocks ten by five by three feet can be taken out. Most of this stone is used for building purposes in the city of Ottawa.

The upper portion of some of the beds presents a banded structure, the lower portion being finely granular.

The stone is dark-grey, easily dressed, and susceptible of a high polish and sharp tooling. The results of a series of analyses of the stone of these quarries will be found in the Annual Report of the Geological Survey for 1892-93, p. 34 R.—*Trenton.*

Caughnawaga, Que.. *Geological Survey.*

65. Limestone.

The Caughnawaga quarries are on lands belonging to the Indians, and at one time furnished large quantities of stone for the upper locks of the Lachine canal, and for those of the Beauharnois canal. Subsequently they were only worked at intervals and on a very limited scale ; but at present considerable quantities of stone are being obtained from them to be used in the enlargement of the Lachine canal. The beds are from nine inches to three feet thick.—*Chazy.*

Montreal, Que.. *Geological Survey.*

64. Limestone.

The Trenton formation yields excellent building stone at Montreal, at Lachevrotière, nearly forty miles above Quebec and at numerous intermediate places. The best stone at Montreal is derived from a band of granular, grey, bituminous limestone, ten feet thick. The beds are from three to eighteen inches thick at the bottom, passing toward the top into a black, nodular, bituminous limestone, which is interstratified, in irregular layers of from one to three inches thick, with black bituminous shale. This grey limestone which is near the base of the formation is a mass of comminuted organic remains, consisting largely of crinoids and cystideans.—*Trenton.*

Montreal, Que.. *Geological Survey.*

6. Limestone slab.—*Trenton*

Lachevrotière, Portneuf Co., Que.................................. *Geological Survey.*

68. Limestone.

This is forty miles above the city of Quebec. The stone is dark grey and spotted.—*Trenton.*

Indiantown, St. John, N.B.. *Stetson, Cutler & Co.*

294. Dolomite.

	Per cent.
Calcium oxide present as carbonate and silicate	31.770
Magnesium " " " "	21.738
Ferric oxide..	.065
Aluminium oxide..	5.169
Silica..	.756
Carbon dioxide (combined with Mg. and Ca. as carbonates and other undetermined substances)..	40.502
	100.000

—*Laurentian.*

Marble.

Beaver Cove, Vancouver Island, B.C.............................. *Geological Survey.*

40. Marble.

Marble occurs in a number of places on the coast of British Columbia and in Vancouver and adjacent islands. Quarries have been opened in a few instances, but as yet the marble has not been extensively utilized as an ornamental stone. The colours are generally grey, often handsomely variegated.

Texada Island, B.C. .... *Geological Survey.*

80. Paper-weight, marble, greyish-white.

80*a*. " " grey-spotted.

The marbles of Texada Island are grey, white and blotched and occur in unlimited quantity, in cliffs from fifty to eighty feet high.

At Marble Cove, marble forms the shore and is found continuously to the north end of the island. A marble quarry has been worked on the north side of the cove.—*Carboniferous.*

Kootenay Lake, B.C. .... *West Kootenay Brick and Lime Co.*

435. Marble, coarse crystalline, white.

Nipigon Bay, Lake Superior, Ont. .... *Geological Survey.*

67. Marble, clouded green.

67*a*. " " brown and grey.

Nipigon Bay, Lake Superior, Ont. .... *Ont. Bureau of Mines.*

1004. Marble, polished.

This material is plentiful on the line of the Canadian Pacific Railway, close to Nipigon Bay and west of Nipigon Station. It is somewhat argillaceous in composition and does not take a high polish, but would be suitable for interior work.—*Cambrian.*

Wolf Lake, Thunder Bay, Ont. .... *Ont. Bureau of Mines.*

1010. Marble.

1009. "

Though not susceptible of a high polish, these marbles are rich in colour, the tints varying from a mellow grey, through deeper shades, to light pinks, purples, greens and browns. Some are banded, some clouded, and others veined.—*Cambrian.*

Renfrew, Renfrew Co., Ont. .... *Ont. Bureau of Mines.*

1014. Grey marble, slab.

1014*a* " " small pillar.

Sanford Property, Barrie Township, Frontenac Co., Ont. .... *Ont. Bureau of Mines.*

1013. Marble pillar.

1013*a*. " slab.

Horton Township, Renfrew Co., Ont. .... *Geological Survey.*

41. Marble.

From a quarry on Lot 11, Con. II. The stone from this quarry has been largely employed for monuments. Blocks from a few inches to several feet thick can be obtained. (See No. 116, p. 201).—*Laurentian.*

Arnprior, Renfrew Co., Ont. .... *Geological Survey.*

73. Marble, paperweight.

In the township of McNab, near the mouth of the Madawaska, a large band of crystalline limestone is exposed. The rock contains dark bands, which are sometimes narrow and sometimes wide, producing where there are no corrugations in the layers, a regularly barred or striped pattern ; when the layers are contorted, a pattern something like that of a curly grained wood results. The colours are various shades of light and dark grey intermingled with white. The dark colours are due to a greater or less amount of graphite which is intimately mixed with the limestone. The texture of the stone is somewhat coarse, but it takes a good polish. Considerable quantities were employed in the decorative work of the Houses of Parliament at Ottawa.—*Laurentian.*

Pakenham, Lanark Co., Ont. .... *Geological Survey.*

76 Paper-weight.

This limestone, when polished, affords a brown marble.—*Black River formation.*

Marmora, Hastings Co., Ont. .... *Ont. Bureau of Mines.*

1012 Marble, white.

Elzevir Township, Lot 3, Con. V., Hastings Co., Ont. ....*Ont. Bureau of Mines.*

1008. Marble, grey and white, banded.

Cornwall, Stormont Co., Ont..................................*Ont. Bureau of Mines.*

1007. Marble, black, cube.

1007*a*. " " cylinder.

This material is argillaceous in composition, but takes a high polish and is commonly known as marble. It has been employed for interior decoration.—*Trenton.*

Cornwall, Stormont Co., Ont.......................................*Geological Survey.*

78 Paper-weight, limestone, black.—*Trenton.*

Hull Township, Wright Co., Que...............................*Geological Survey.*

42. Serpentine marble.

This specimen comes from an extensive band well exposed, overlying a white crystalline limestone. Large blocks could be easily quarried.—*Laurentian.*

Grenville Township, Argenteuil Co., Que. ....*Geological Survey.*

7. Marble, slab.

82. Paper-weight, serpentine marble, dark-green and white.

83. Paper-weight, " " light yellowish-green and white.

84. Paper-weight, " " dark-green yellowish and white.

670. Serpentine marble, cube.

In the township of Grenville and in its augmentation a band of crystalline limestone, containing *Eozoon Canadense* is extensively developed, and affords in many places a peculiar variety of marble, having a white ground, marked with green spots and stripes of serpentine, which occasionally form angular masses, several inches in diameter. Usually the serpentine-limestone of the Laurentian, has a yellowish tint, and presents when polished a very handsome appearance. The Grenville bed has a thickness of some hundreds of feet.—*Laurentian.*

Caughnawaga, Laprairie Co., Que .... *Geological Survey.*

74. Paper-weight, limestone.

Some of the limestones of the Chazy and Trenton, are sufficiently crystalline and compact to polish well, forming handsome marbles in which the organic remains are displayed. This specimen is grey with red spots (generally corals).—*Chazy.*

Pointe Claire, Jacques Cartier Co., Que. .... *Geological Survey.*

77. Paper-weight, limestone, black.—*Black River.*

Portage du Fort, Pontiac Co., Que .... *Geological Survey.*

12. One block white marble.—*Laurentian.*

Kensington Township, Wright Co., Que. .... *Geological Survey.*

71. Column and base of marble, dark grey.

71*a*. Slab of marble, dark grey and spotted.

71*b*. Paper-weight, marble banded wavy and spotted.

These handsome marbles occur near Maniwaki and not far from the line of the Gatineau Valley Railway. They have not yet been utilized commercially.—*Laurentian.*

Dudswell, Wolfe Co., Que .... *Geological Survey.*

1. Column of marble.

1*a*. Slabs "

The marble deposits of Dudswell have been known for a long time. They are referable to the Silurian system and some beds are composed entirely of organic remains. Several varieties of marble are found in the quarry, among others a kind showing banding and mottling of yellow upon a dark or black mass, bearing a strong resemblance to Porter marble from northern Italy, sometimes known as black-and-gold marble. On analysis the resemblance between the two is further sustained by the fact that in both cases, the ground is pure limestone, and the yellow veins are dolomite.—*Silurian.*

Dudswell, Wolfe Co., Que.. *Geological Survey.*

72. Paper-weight, marble, fawn colour.

72*a*. " dark dove and yellowish-white.

72*b*. " cream and yellow.

72*c*. " greyish and yellowish white.

Dudswell, Wolfe Co., Que.. *Geological Survey.*

253. Slab of marble, polished.

From the Dudswell Lime and Marble Company's quarry.

St. Armand, Missisquoi Co., Que.................................. *Geological Survey.*

79. Paper-weight, marble, white.

This marble occurs in great abundance in the immediate vicinity of Phillipsburg, on Lake Champlain. It is easily cut and takes a good polish.—*Cambro-Silurian*

St. Dominique, Soulanges Co., Que.............................. *Geological Survey.*

75. Paper-weight, limestone.

This place is not far from Montreal. The stone takes a good polish and is easily cut.—*Chazy.*

St. Joseph, Beauce Co., Que...................................... *Geological Survey.*

81. Paper-weight, marble.

117. One slab marble.

This handsome marble occurs near the River Guillaume, associated with red shales and sandstones, resembling those of Sillery near Quebec. The bed is from ten to forty feet thick, and in a distance of half a mile on its strike is exposed in four places. The marble takes a fair polish and could be obtained in large blocks. The locality is forty-five miles south of Quebec.

Escasonie, Cape Breton Co., N.S.................. *E. T. Brown, Escasonie, N.S.*

1159. Marble.

904. "

Lime and Cement.

Bull River, East Kootenay, B C.......................*E. Wilke, Fort Steele, B.C.*

1026. Limestone containing some magnesia.

Shallow Lake, Grey Co., Ont .... { *Owen Sound Cement Works, Owen Sound, Ont*

263. Clay.

263*a*. Clinker burnt from marl and clay.

263*b*. Cement ground from clinker.

263*c*. Drain tile made from cement (hollow ware), manufactured and exhibited by E. North, London, Ont.

The Owen Sound Cement Works are among the important producers of Portland cement in Canada. Their works, which are at Shallow Lake, are of modern design and can turn out 300 barrels a day. They are very advantageously situated, having the crude materials near at hand. The clay used in the manufacture of cement is obtained from the bed of Shallow Lake, while the marl is from a bed underlying the clay, the two being extracted together.

Guelph, Wellington Co., Ont.................... *Toronto Lime Co., Guelph, Ont.*

250 and 250*a*. Dolomite and lime.—*Niagara.*

Guelph, Wellington Co., Ont......................... *Mr. Kennedy, Guelph, Ont.*

251 and 251*a*. Dolomite and lime.—*Niagara.*

Thorold, Welland Co., Ont........ ....*Messrs. Battle Bros., Thorold, Ont.*

257 and 257*a*. Cement stone and cement.—*Niagara.*

Queenston, Niagara, Lincoln Co., Ont. } *Queenston Cement Works, Queenston, Ont.*

258. Cement stone.

258*a*. Stone burnt.

258*b*. Cement.

Niagara.

Galt, Waterloo Co., Ont.....................................*Mr. Ballantyne, Galt, Ont.*

254 and 254*a*. Limestone and lime—.*Niagara.*

Limehouse, Halton Co., Ont................*Toronto Lime Co., Limehouse, Ont.*

255 and 255*a*. Limestone and lime.—*Niagara.*

Limehouse, Halton Co., Ont................*Toronto Lime Co., Limehouse. Ont.*

259. Cement stone.

259*a*. Stone burnt.

259*b*. Cement.

Niagara.

St. Mary's, Perth Co., Ont..............................*Mr. Slater, St. Mary's, Ont.*

252 and 252*a*. Limestone and Lime.—*Corniferous.*

Dundas, Wentworth Co., Ont..*Geological Survey.*

88. Dolomite, grey.

From the quarry near the railway station. The beds are here from three inches to three feet thick, the total thickness being about sixty feet. A specimen like that exhibited was found to contain: carbonate of lime 51.85 per cent.; carbonate of magnesia 41.65 per cent.; carbonate of iron 0.62 per cent.; insoluble matter 5.80 per cent. The stone is chiefly used for lime making and road metal.—*Niagara.*

Pakenham, Lanark Co., Ont.........................*Mr. Mooney, Pakenham, Ont.*

256 and 256*a*. Limestone and lime.—*Trenton.*

From Mooney's Kiln.

Renfrew, Horton Township, Ont.................*J. A. Jamieson, Renfrew, Ont.*

739. Limestone.

739*a*. Lime.—*Laurentian*

Hull Township, Wright Co., Que...........*Messrs. Wright & Co., Hull, Que.*

770. Limestone.

770*a*. Lime.—*Trenton.*

The limestone underlies the city of Hull. There are several beds in this quarry, the uppermost being worked for lime, and the lower ones for building stone. An analysis of the upper bed gave:—

	Per cent.
Carbonate of lime	97.66
" of magnesia	1.38
" of iron	0.16
Insoluble matter	.67
	99.87

Hull Township, Wright Co., Que............*Messrs. Wright & Co., Hull, Que.*

771. Limestone.

771*a*. Clay.

771*b*. Clinker.

771*c*. Cement.

The cement manufactured by Wright & Co. is usually known as Hull cement, but the raw material is derived from Nepean township, Ont. This rock is a limestone of the Chazy formation of which there are bands precisely similar on the Quebec side of the Ottawa. It contains about twelve per cent. of carbonate of magnesia.—*Chazy*.

Dudswell, Wolfe Co., Que. } *Dudswell Lime & Marble Co., Dudswell, Que.*

253 and 253*a*. Limestone and lime.

The quarry has been worked for years for the production of lime. The conditions for cheap production are very favorable. The floor of the quarry is on the level with the mouths of the kilns which are heated by wood. The kilns are connected by a branch line with the Quebec Central Railway.—*Silurian*.

Beauport Quarry, Beauport, Quebec Co., Que. }.......................*Mr. Parent, Quebec.*

328 and 328*a*. Limestone and lime.—*Trenton*.

Quebec City, Quebec...*Geological Survey.*

341. Hydraulic cement-stone.—*Quebec*.

This is black argillaceous limestone of the Trenton-Utica formation. On calcining, the black matter being of carbonaceous origin, disappears, the rock becoming yellowish and producing cement of good quality.

In New Brunswick, limestones are met with in not less than six distinct geological formations. They are valuable as a source of lime, and for this purpose the oldest, which are the Laurentian, seem to be best adapted. These Laurentian limestones are best developed in St. John county, where certain beds attain a thickness of 350 feet. Some of this stone is dark-grey in colour, owing to disseminated graphite, which, however is wholly lost on calcination. A great proportion of the lime manufactured in St. John county is exported to the United States.

Limestones have also been recognized in the Huronian, Cambro-Silurian, Silurian and Carboniferous formations, but in much thinner and more impure beds. These are only used for local consumption.

Randolph, St. John, N.B.........*Messrs. Randolph & Baker, St. John, N.B.*

332. Limestone.

332*a*. Lime.

Analysis of burnt lime, by A. E. McIntyre ; lime 97.33 per cent. ; magnesia 1.93 per cent.—*Laurentian.*

Randolph, St. John, N.B..............................*Messrs. Randolph & Baker.*

728. Dolomite.

This rock yields on analysis 44.9 per cent. of carbonate of magnesia. It occurs in certain bands in the quarry and has attracted attention for employment in connection with wood-pulp manufacture.—*Laurentian.*

Indiantown, St. John, N.B..................*Stetson Cutler & Co., St. John, N.B.*

292 and 293. Limestone.—*Laurentian.*

Holmes' Quarry, Springville, Pictou Co., N.S. — *Nova Scotia Steel Co., New Glasgow, N.S.*

853. Limestone.—*Carboniferous.*

This quarry is owned by the Nova Scotia Steel Co. The following is an average analysis of the limestone :

	Per cent.
Moisture	0.20
Silica	3.10
Alumina	0.24
Ferric oxide	1.06
Calcium carbonate	88.94
Magnesium carbonate	4.90
Calcium sulphate	0.20
Lime	49.81
Magnesia	2.35

The limestones of Pictou Co., while often well suited for making lime, are chiefly employed as fluxes in iron smelting, for which purpose they are well adapted. Their outcrops are conveniently situated for quarrying and transport to the furnaces.

The position of the East River limestones forms an important item in their adaptibility for fluxing purposes ; they occur as a band, everywhere between the coal and the iron, so that their transport becomes a matter of comparatively low cost, and large quantities are available by simple quarry work.

Garafraxa Township, Wellington Co., Ont. .... *Geological Survey.*

261. Clay.

Shallow Lake, Grey Co., Ont. .... *Owen Sound Cement Works, Owen Sound, Ont.*

262. Shell marl.

This marl is used in the manufacture of Portland cement. (See exhibit No. 263 p. 209).

Caledon Township, Peel Co., Ont................................ *Geological Survey.*

260. Shell Marl.

Gypsum.

Gypsum is worked in Ontario in rocks of the Onondaga formation (Silurian); in New Brunswick and Nova Scotia this mineral is extensively developed in the Carboniferous system underlying the productive coal-measures.

In British Columbia, it has been discovered on Salmon River, in the Yale district. The principal deposit, in which a tunnel has been driven, is over one hundred feet in thickness. This is massive and perfectly white in some places.

In the Cretaceous formation of the great plains it occurs sparingly in the form of selenite crystals disseminated through shales and clays. On the Peace and Salt rivers, tributaries of the Mackenzie, it is found in thick beds of Devonian age, and occurs again in the rocks of the same system on rivers flowing into James Bay.

Tobique, Victoria Co., N.B.. *Geological Survey.*

170. Gypsum.

The gypsum beds occurring in New Brunswick are comprised in the Lower Carboniferous and are both numerous and extensive. In the Tobique valley very massive deposits of impure gypsum occur, pale-green and reddish in colour, mostly fibrous, aggregating 350 feet in thickness. Along the Tobique River the presence of gypsum beds is marked by the occurrence of high cliffs of this mineral, some attaining 130 feet in height. These are usually coarsely granular, looking like rough sandstone, stained and mottled with red and green. This gypsum is too impure to be used as plaster of Paris, but it is well adapted for use as a fertilizer.—*Carboniferous.*

Hillsborough, Albert Co., N.B. .... *Geological Survey.*

225. Gypsum.

The largest deposits of gypsum known at present are those of Hillsborough in Albert county, where extensive quarries have been opened, and whence great quantities have been and are still being removed for calcination and exportation. The mineral is usually met with in very irregular masses, associated with red marls, sandstones and limestones, at or near the summit of the series, and varies much in character. Thus at Hillsborough, in the quarries now being worked, there is exposed a total head of rock of from 90 to 100 feet, of which about 70 feet, forming the upper portion, consists for the most part of "soft plaster" or true gypsum, which rests on beds of "hard plaster" or anhydrite of unknown thickness. At the same place considerable masses of a very beautiful snow-white gypsum or alabaster are also associated with the varieties named above, but comparatively little selenite is found; while at Petitcodiac, where the deposit has a breadth of about forty rods, and a total length of about one mile, the whole is fibrous and highly crystalline, and is traversed through its entire extent by a vein of nearly pure selenite, eight feet wide.

The superior quality of plaster of Paris made from Hillsborough gypsum has long been recognized. A great part of the production of the quarries of Hillsborough is exported to the United States, where it is used in the manufacture of plaster of Paris. Several quarries have been opened at different points of the deposit, having working faces from thirty to one hundred feet in height. The annual production of New Brunswick was in 1898 about 86,000 tons, valued at nearly $122,000.

Carboniferous.

Hillsborough, Albert Co., N.B. .... *Albert Manufacturing Co.*

794. Gypsum.

794*a*. Manufactures of gypsum.

794*b*. Calcined.

Windsor, Hants Co., N.S.......................*Clarence Dimock, Windsor, N.S.*

817. Gypsum.

817*a*. Selenite.

817*b*. Anhydrite.

Gypsum occurs in Nova Scotia in very extensive deposits, varying in thickness from a few inches to 120 feet. These deposits are found in the Carboniferous system. Facilities for quarrying the gypsum have allowed its extraction at a very low rate. The quality is excellent. It may be remarked that at many points in the province of Nova Scotia, the pure variety of gypsum, selenite, can be procured in large quantities.

Windsor, Hants Co., N.S.....................*Windsor Plaster Co., Windsor, N.S.*

897. Gypsum, products.

Windsor, Hants Co., N.S..........................*Charles Wilkins, Windsor, N.S.*

892. Gypsum.

892*a*. "

892*b*. "

Windsor, Hants Co., N.S........ ....*George Redden, Windsor, N.S.*

894. Gypsum.

894*a*. "

Newport, Hants Co., N.S....................................*L. Sweet, Newport, N.S.*

905. Gypsum.

Newport, Hants Co., N.S................ *Messrs. Haley & Russell, Windsor, N.S.*

893. Gypsum.

Newport Station, Hants Co., N.S..................*T. A. Mosher, Windsor, N.S.*

1158. Gypsum.

Wentworth, Cumberland Co., N.S...............*T. A. Mosher, Windsor, N.S.*

895. Gypsum.

Enfield, Hants Co., N.S. ....*H. Donaldson, Enfield, N.S.*

860. Selenite.

Bricks and Terra-cotta.

The manufacture of bricks is very extensively carried on in the vicinity of the cities and in the more thickly inhabited districts of the provinces of Ontario and Quebec. In Manitoba and the fertile districts of the North-West Territory brick-making is yet in its infancy, but will doubtless soon become a very important industry, not only because of the scarcity of good building stone, but also on account of the abundance of clay admirably suited for this purpose.

In Ontario two sorts of clays are employed: one blue when moist, and whitish or yellowish after burning, known geologically as the *Erie clay;* the other of a more recent formation, brownish in the raw state, but usually burning red, and which has been designated the *Saugeen clay.* The Erie clay is sometimes found in beds as much as sixty feet thick, while the Saugeen clays are in thinner deposits. Both of them contain a considerable quantity of carbonate of lime. The white bricks command a higher price than the red, and are made in large quantities in a number of places between Brockville on the east, and Lake Huron on the west. In that part of Ontario between the St. Lawrence and Ottawa, as well as in the province of Quebec, bricks are usually made from a truly marine clay overlying the boulder-clay, and geologically known as the Leda clay, and are always of a red colour. Bricks of a superior quality and adapted for special purposes, such as paving, are also now made from the Utica, Lorraine and other Palæozoic shale deposits.

In New Brunswick and Nova Scotia, clays representing the Leda clay are employed, and at a distance from the coast, clays, also of glacial age, but not clearly marine, are also used. In Prince Edward Island, Triassic or Upper Carboniferous clays, and modern alluvial deposits formed from these rocks, are employed. These are red both before and after baking.

In Manitoba the materials hitherto employed in brick-making are silts and silty clays, the deposits of a great lake which occupied the Red River valley towards the close of the glacial period. These produce cream-coloured bricks. In the North-West Territory clays of the glacial age are often available, but in addition to these the friable deposits of the Laramie and Cretaceous formations are capable of affording a great variety of clays and silts applicable, not only to ordinary brick-making, but also to the manufacture of fire-bricks and tiles of superior quality, as well as of ordinary earthenware. The frequent association of these clays with lignites and coals will render them in future particularly valuable.

In British Columbia, materials like the last-mentioned, are often abundant, but the clays so far used (chiefly in the vicinity of Victoria, New Westminster and Nanaimo) are those overlying the boulder-clay, and which produce red bricks of fair quality.

No attempt has been made to fully represent the brick-making industry in the present collection, but a few special qualities of bricks, etc., are enumerated below.

Humber River, York Co., Ont........ } *Ontario Paving Brick Co., Toronto Junction, Ont.*

679. Shale, three varieties.

679*a*. Paving bricks for sidewalks.

679*b*. " " streets.

The Ontario Paving Brick Co. was organized in 1895, and erected a well equipped factory for the manufacture of paving bricks, at Carlton, a short distance from the city limits of Toronto.—*Lorraine.*

Milton, Halton Co., Ont ....*Milton Pressed Brick Co., Milton, Ont.*

1002. Pressed bricks, (front bricks).

Clinton Township, Lot 23, Con. 1, Lincoln Co., Ont. } *Beamsville Brick and Terra Cotta Co., Beamsville, Ont.*

1184. Red shale, raw material.

1184*a*. Red ornamental pressed bricks.

1184*b*. Pressed bricks of different shades.

1184*c*. Vitrified brick.

Laprairie, Que.....................*Laprairie Pressed Brick Co., Laprairie, Que.*

676. Shale.

676*a*. Assorted bricks.

This company was organized in 1893 and has its works at Laprairie, opposite Montreal. The raw material used is the black shale of the Utica formation. This is submitted to crushing, moulding under a pressure of fifty tons, and burnt. The whole work is automatic, each pressing machine is operated by one man and has a capacity of 15,000 bricks a day. The plant of the Company is very complete, consisting of rock drills for mining the shale, crushers, pressing machines, continuous kilns, etc.—*Utica.*

Montreal, Que...............*The Montreal Terra Cotta Lumber Co., Montreal.*

353. Porous terra-cotta fire-proofing bricks.

353*a*. Three samples clay.